SPECIAL ISSUE CONTAINING GENERAL REPORTS OF THE SECOND NASHVILLE MEETING OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE AND ASSOCIATED SOCIETIES. EDITED BY BURTON E. LIVINGSTON, PERMANENT SECRETARY

SCIENCE

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Science News x

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THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

GENERAL REPORTS OF THE SECOND NASHVILLE MEETING OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE AND ASSOCIATED SOCIETIES

GENERAL FEATURES

IN convocation week, from December 26 to December 31, was held at Nashville, Tennessee, the eighty-fourth meeting of the American Association for the Advancement of Science, the annual meeting for the association year 1927–28. This was the second Nashville meeting, the association having met in that city once before, in August, 1877. The sessions of the association and the associated societies were well accommodated mainly in the buildings of Vanderbilt University, the George Peabody College for Teachers and the Ward-Belmont College for Women.

President A. A. Noyes, eminent leader in chemical research and in chemical instruction, director of the Gates Chemical Laboratory of the California Institute of Technology, Pasadena, presided at the meeting and took part in many sessions. The retiring president, Dr. L. H. Bailey, well-known author and editor of articles and standard books on botany, horticulture and rural life, was unable to be present, because of convalescence from a serious illness, but he sent a note of greeting, which was read at the opening session.

Fourteen sections of the American Association appeared in the program of this meeting and thirty-five independent organizations of science workers met

with the association. Most of these are officially *associated,* and the majority are officially *affiliated* with the association. Their names will be shown in the reports on the sessions of sections and societies, in the next following issue of SCIENCE.

ATTENDANCE, SESSIONS AND PAPERS

One thousand six hundred and sixty-two persons were registered at the second Nashville meeting. While this registration is not so large as that for some other recent annual meetings, it and other features are indicative of very widespread interest and mark this meeting as very successful. For the sake of comparison, the registration records of the last eight meetings are shown below:

Third Chicago Meeting (Dec., 1920), 2,413.
Second Toronto Meeting (Dec., 1921), 1,832.
Fourth Boston Meeting (Dec., 1922), 2,339.
Third Cincinnati Meeting (Dec., 1923), 2,211.
Fifth Washington Meeting (Dec., 1924), 4,206.
Kansas City Meeting (Dec., 1925), 1,931.
Fifth Philadelphia Meeting (Dec., 1926), 3,181.
Second Nashville Meeting (Dec., 1927), 1,662.

It is certain that the number of persons actually in attendance was considerably larger than is indicated by the registration record, for many local people and some from away failed to register.

The residence distribution of those who registered at Nashville is shown by the accompanying list.

Registration at Nashville by States and Provinces

Alabama	41
Arizona	5
Arkansas	23
Australia	1
California	31
Colorado	7
Connecticut	19
Cuba	1
Delaware	5
District of Columbia	79
England	2
Florida	34
France	1
Georgia	40
Illinois	156
Indiana	57
Iowa	54
Kansas	33
Kentucky	38
Louisiana	43
Maine	3
Manitoba	3
Maryland	25
Massachusetts	38
Mexico	2
Michigan	59
Minnesota	27
Mississippi	29
Missouri	61
Montana	1
Nebraska	14
New Hampshire	3
New Jersey	17
New Mexico	1
New York	126
North Carolina	47
North Dakota	5
Ohio	111
Oklahoma	17
Ontario	11
Oregon	1
Pennsylvania	61
Porto Rico	3
Quebec	2
Rhode Island	9
Saskatchewan	2
South Carolina	19
South Dakota	1
Sweden	1
Nashville	67
Tennessee (outside of Nashville)	76
Texas	41
Utah	3
Vermont	3
Virginia	30
Washington	8
West Virginia	14
Wisconsin	48
Wyoming	3
Total	1,662

Altogether there were one hundred and sixty-three scientific sessions held at Nashville. Omitting about fifty papers presented by title only, 1,141 papers and addresses were delivered. There were thirty-one luncheons, dinners, smokers, etc., all well attended.

MEETING PLACES AND FACILITIES

The general hotel headquarters were at the Andrew Jackson Hotel, which very generously placed many complimentary rooms at the disposal of the association. Other hotels were headquarters for societies. About four hundred persons were lodged very conveniently and inexpensively in dormitories of the George Peabody College for Teachers and the Ward-Belmont College for Women and the hotel headquarters for some societies were in those dormitories, which were made specially available for this purpose. Meals and luncheons were served at the cafeterias of Wesley Hall and Kissam Hall, Vanderbilt University, at the cafeteria of the George Peabody College, at the dining room of the Ward-Belmont College for Women, and at the cafeteria of the Southern Y. M. C. A. Graduate School.

The registration offices (in charge of Mr. Sam Woodley, executive assistant, of the Washington office of the association), the news office (in charge of Mr. Austin H. Clark, news manager) and the general science exhibition (in charge of Major H. S. Kimberly, exhibition manager) were all in the lobbies of the Andrew Jackson Hotel.

A total number of twenty-three lanterns and twenty-two daylight screens were very kindly loaned by the Bausch and Lomb Optical Co., of Rochester, N. Y. The association hereby expresses to that firm its very appreciative thanks for this great help.

The Nashville educational institutions were very generous in helping to make this meeting a success. Rooms for the sessions were placed at the disposal of the association by Vanderbilt University, the George Peabody College for Women, the Southern Y. M. C. A. Graduate School and the Scarritt College for Christian Workers. To all these institutions the association and the associated organizations are very grateful.

The Nashville Chamber of Commerce was very generous to this convention and a large degree of credit and appreciative thanks for the very successful outcome are due to the indefatigable personal interest and industry of Mr. W. N. Porter, convention secretary of that organization.

Dr. W. S. Leathers, professor of medicine and public health, Vanderbilt Medical School, was general chairman of the Nashville committees. He devoted himself with great efficiency and tact to the very complicated preparations throughout many months before the meeting opened. To his able general oversight and foresight in this work the association and the associated societies owe very much indeed.

Mr. John W. Barton, vice-president of the Ward-Belmont School, was very active as chairman of the committee on general arrangements and of the committee on finance and the results of his very generous and efficient services were much in evidence throughout the meeting. To him the association and all who attended are very grateful indeed.

All the members of the several local committees and the representatives for the several sections of the association, whose names are shown below, joined in the great cooperative work that made the second Nashville meeting so very satisfactory; to them is here expressed the hearty gratitude of the association and of all who attended this meeting.

LOCAL COMMITTEES FOR THE SECOND NASHVILLE MEETING

General Chairman of Nashville Committees

W. S. Leathers, M.D., professor of preventive medicine and public health, Vanderbilt Medical School.

Committee on Arrangements

John W. Barton, *chairman*, vice-president of Ward-Belmont School.
J. A. Webb, *secretary*, professor of chemistry, George Peabody College.
L. C. Glenn, professor of geology, Vanderbilt University.
G. Canby Robinson, dean and professor of medicine, Vanderbilt Medical School.
J. T. McGill, professor emeritus of organic chemistry, Vanderbilt University.
A. E. Parkins, professor of geography, George Peabody College.
W. N. Porter, convention secretary of the Nashville Chamber of Commerce.
J. M. Breckenridge, professor of chemistry, Vanderbilt University.
G. R. Mayfield, associate professor of German, Vanderbilt University.
A. F. Ganier, assistant engineer, N. C. and St. Louis Railroad.
H. H. Shoulders, president of the Nashville Academy of Medicine.
E. L. Bishop, state health commissioner of Tennessee.
A. W. Wright, assistant professor of pathology, Vanderbilt Medical School.
H. C. Weber, superintendent of the Nashville Public Schools.

Committee on Finance

John W. Barton, *chairman*
Henry E. Colton
Charles M. McCabe

Committee on Meeting Places

A. E. Parkins, *chairman*
F. J. Lewis
R. E. Baber
W. H. Hollinshead
W. D. Strayhorn

Committee on Hotels and Housing

W. N. Porter, *chairman*
Lee J. Loventhal
S. J. Garrison

Committee on Exhibition

J. M. Breckenridge, *chairman*
F. B. Dresslar
E. W. Goodpasture

Committee on Local Transportation

A. F. Ganier, *chairman*
J. P. W. Brown
W. F. Pond

Committee on Publicity and Non-technical Lectures

G. R. Mayfield, *chairman*
H. A. Webb
T. J. Horner
T. H. Alexander
J. S. Stahlman, Jr.

Committee on Entertainment

A. W. Wright, *chairman*
C. P. Connell
Mrs. A. B. Benedict
W. W. Carpenter
T. Graham Hall
Thomas E. Jones

Local Representatives for Sections of the Association

Section A (Mathematics): C. M. Sarratt
Section B (Physics): C. R. Fountain
Section C (Chemistry): L. J. Bircher
Section D (Astronomy): James McClure
Section E (Geology and Geography): L. C. Glenn
Section F (Zoological Sciences): E. E. Reinke
Section G (Botanical Sciences): J. M. Shaver
Section H (Anthropology): W. D. Weatherford
Section I (Psychology): Joseph Peterson
Section K (Social and Economic Sciences): C. B. Duncan
Section L (Historical and Philological Sciences): H. C. Sanborn
Section M (Engineering): W. H. Schuerman
Section N (Medical Sciences): P. D. Lamson
Section O (Agriculture): K. C. Davis
Section Q (Education): S. J. Phelps
For Organizations not related to Any Particular Section: C. P. Connell

OFFICIAL REPRESENTATION AT THE NASHVILLE MEETING

Cards of invitation were sent out, as usual, asking research institutions and laboratories and scientific organizations to name representatives for the meeting. Following are the names of those that did so: University of Arizona; University of California; Stanford University; University of Denver; Wesleyan University; Carnegie Institution of Washington; Federal Horticultural Board; National Research Council; Smithsonian Institution; U. S. Department of Agriculture; U. S. Coast and Geodetic Survey; U. S. Bureau of Entomology; U. S. Public Health Service; U. S. Weather Bureau; War Department; Northwestern University; Drake University; Iowa State College; University of Kentucky; Clark University; Harvard University; Wellesley College; Worcester Polytechnic Institute; University of Michigan; University of Minnesota; St. Louis University; Washington University; New Jersey Agricultural Experiment Station; American Museum of Natural History; Brooklyn Botanic Garden; College of the City of New York; Cooper Union; University of Rochester; Rockefeller Institute for Medical Research; Case School of Applied Science; Marietta College; Oberlin College; Ohio Wesleyan University; Western Reserve University; Haverford College; Mellon Institute of Industrial Research; University of Pittsburgh; Brown University; University of Texas; West Virginia University; Eastman Kodak Company, Rochester, N. Y.; B. F. Goodrich Company, Akron, Ohio; Incandescent Lamp Department of General Electric Co., Nela Park, Cleveland, Ohio; Leeds & Northrup Company, Philadelphia, Pa.; Western Electric Company, New York, N. Y.

Many other organizations and institutions were unofficially represented at the meeting, and it is probable that some official representatives failed to register as such.

THE PRELIMINARY ANNOUNCEMENT AND THE GENERAL PROGRAM

The preliminary announcement of the Nashville meeting appeared in SCIENCE for December 2, 1927, occupying about seventeen pages of that issue, which was sent to all members of the association. It contained the usual preliminary information about the meeting, including statements about the many section and society programs. The latter statements were based on material supplied by the section and society secretaries.

The secretaries also supplied the manuscripts for their programs as these appeared in the general program of the meeting and most of the manuscripts were at hand by December 15. The editing and printing of the general program, a book of over 130 pages, was again in the hands of the program editor, Dr. Sam F. Trelease, of Columbia University. Dr. Trelease and Mrs. Trelease went to Nashville and devoted themselves, day and night, to this work from December 15 to the time the book was finished, on the day before Christmas. This is a very difficult kind of material from the editorial viewpoint, a large proportion of the composition being classified headings and subheads, technical words and phrases and personal names. Our hearty thanks are again due to Dr. and Mrs. Trelease, and also to the botanical department of Columbia University, of which he is a member, which made it possible, as in recent years, for the program editor to devote so much time to the general program during more than a month just preceding the meeting.

A new feature of the general program this year is a fourteen-page index of names of persons reading papers or delivering addresses, an index of about 1,200 entries. This index, which represents about fifteen hours of practically uninterrupted labor on the part of the editor and Mrs. Trelease—for it could not be prepared till page proofs of the book were available and no minute could then be lost—is an exceedingly valuable feature of the general program, which was used and appreciated by every one.

Sixteen pages of advertising—of books and apparatus for science work—are included in the Nashville program, the income from which helped to pay the

cost of printing the book. The hearty cooperation of the advertising firms is greatly appreciated. Their names are shown below. An E following a name indicates that the firm thus designated had an exhibit in the general exhibition.

American Association for Medical Progress, Inc. (E), 370 Seventh Avenue, New York, N. Y.
Baker and Co., Inc., 54 Austin St., Newark, N. J.
Bausch and Lomb Optical Co. (E), Rochester, N. Y.
Brooklyn Botanic Garden, 1000 Washington Ave., Brooklyn, N. Y.
Eastman Kodak Co., Rochester, N. Y.
General Biological Supply House (E), 761 East 69th Place, Chicago, Ill.
General Radio Co., 30 State St., Cambridge, Mass.
Kny-Scheerer Corporation of America, 10 West 25th St., New York, N. Y.
Lancaster Press, Inc., Lancaster, Pa.
E. Leitz, Inc. (E), 60 East 10th St., New York, N. Y.
Mallinckrodt Chemical Works, St. Louis, Mo.
Open Court Publishing Co., 337 E. Chicago Ave., Chicago, Ill.
Thermal Syndicate, Ltd., 58 Schenectady Ave., Brooklyn, N. Y.
Triarch Botanical Products (E), Botanical Laboratory, University of Pennsylvania, Philadelphia, Pa.
University of Chicago Press (E), 5750 Ellis Ave., Chicago, Ill.
Victor Talking Machine Co. (E), Camden, N. J.
John Wiley and Sons, Inc., 440 Fourth Ave., New York, N. Y.
Williams and Wilkins Co., Mt. Royal and Guilford Aves., Baltimore, Md.

The typographical and artistic excellence of the general program are largely due to the very fine work of the Cullom and Ghertner Co., of Nashville, who cooperated very cordially with the program editor in every respect.

REDUCED RAILWAY FARES

Reduced railway rates, on the certificate plan, were available for those who attended this meeting, as has been true of recent meetings. The money-saving to those who took advantage of this arrangement amounted to one fourth of the regular railway fare; that is, the reduced rate for the round trip was one and one half times the regular one-way fare. The total number of railway certificates validated at Nashville was 1,057. They represented an aggregate of $25,701.18 for the one-way trips to Nashville and an aggregate of half of that amount, or $12,850.59, for the return trips. The total amount saved through the availability of the reduced rates was therefore $12,850.59, which amounts to an average saving per person of $12.15. This constitutes a very tangible service accomplished by the association for its members and for the members of the organization meeting with it.

THE SCIENCE EXHIBITION

The general science exhibition was arranged in the lobby of the Andrew Jackson Hotel, where the registration and the news offices were also located. The general exhibition was in charge of the exhibition manager, Major H. S. Kimberly, who was ably assisted by the local committee on exhibition, the chairman of which was Professor J. M. Breckenridge, of Vanderbilt University. The management of the Andrew Jackson Hotel, in charge of Mr. Turney M. Cunningham, was very helpful and cooperated cordially in this as well as in other features of the arrangements. The displays of the exhibitors were intensely interesting to all present and the exhibition played a very important part as the main social center of the meeting.

The following is a list of the firms and organizations that occupied booths. The names of those that also had advertising space in the general program are each followed by an A.

American Association for Medical Progress (A), New York, N. Y.
Bausch and Lomb Optical Co. (A), Rochester, N. Y.
P. Blakiston's Son and Co., Philadelphia, Pa.
Central Scientific Co., Chicago, Ill.
Coleman and Bell Co., Norwood, Ohio.
Denoyer-Geppert Co., Chicago, Ill.
General Biological Supply House (A), Chicago, Ill.
General Electric Co., Schenectady, N. Y.
La Motte Chemical Products Co., Baltimore, Md.
Leeds and Northrup Co., Philadelphia, Pa.
E. Leitz, Inc. (A), New York, N. Y.
Southern Biological Supply Co., Inc., New Orleans, La.
Spencer Lens Co., Buffalo, N. Y.
Triarch Botanical Products (A), Philadelphia, Pa.
University of Chicago Press (A), Chicago, Ill.
University of North Carolina Press, Chapel Hill, N. Car.
Victor Talking Machine Co. (A), Camden, N. J.
Weston Electrical Instrument Corporation, Newark, N. J.

An exhibit of photographs of the region of the Great Smoky Mountains was interesting to those who like the out-of-doors. It was contributed by the Knoxville Chamber of Commerce. Several fine exhibits by the special scientific societies were housed at the Southern Y. M. C. A. Graduate School. It is unfortunate that we have not yet reached the time when these special exhibitions by scientific societies can be given adequate notice in the general program and in these reports. Information concerning them seems always to be inadequate for more than mere mention. We shall continue to try to secure good accounts of them in time for printing in the programs of future meetings.

THE FIFTH AWARD OF THE AMERICAN ASSOCIATION PRIZE

The American Association prize of $1,000 is awarded annually to the author of a notable contri-

bution to the advancement of science given at the annual meeting. The funds are generously supplied by a member who wishes his name withheld. Nominations for the Nashville prize were received from the secretaries of the sections and societies and the award was made by the committee on prize award and announced through the news service Friday evening.

The winner of the prize is this year Dr. H. J. Muller, professor of zoology in the University of Texas, for his outstanding contribution entitled "Effects of X-Radiation on Genes and Chromosomes," which was presented before the Joint Genetics Sections of the American Society of Zoologists and the Botanical Society of America, in the Wednesday-morning session. The following abstract of Dr. Muller's paper has been contributed by him, having been sent from Austin, Texas, by air mail.

"The Effects of X-Radiation on Genes and Chromosomes."

(*Abstract*)

This paper reported the author's experiments of the past fifteen months on the hereditary effects on X-rays applied to the fruit fly, *Drosophila melanogaster*. By means of special courses, the discrimination of mutations in individual genes from genetic recombinations of various sorts (due to segregation, non-disjunction, etc.), was facilitated, and lethal as well as visible changes were rendered detectable. Results in the second and later generations, based on several thousand cultures, showed that gene mutations had occurred in the most heavily treated germ cells at about 150 times the frequency of those in the controls, derived from the same source, while in germ cells less heavily treated the result was intermediate. Germ cells in all stages studied were susceptible to the effect: these included oögonia, ova, spermatozoa shortly before fertilization, and spermatozoa when rayed either in the male or in the female receptacles six or more days prior to fertilization.

The induced mutations resembled spontaneous ones, inasmuch as: (1) The great majority were lethal; of the rest most, but not all, reduced viability or fertility. (2) Recessives greatly outnumbered definite dominants. (3) Many of the visible effects were relatively inconspicuous. (4) Though "new" mutations were somewhat more frequent, there were also numerous repetitions of familiar mutations. (5) All regions of the chromatin were affected, but the induced mutations were more densely distributed in those regions of the linkage map in which more spontaneous mutations have occurred. (6) Multiple allelomorphism occurred. (7) So also did reverse mutation of genes already mutant when treated. The two latter facts argue against the effects always being complete losses or inactivations. (8) Though point-mutations were the rule, there was an occasional "line-mutation" involving a row of neighboring genes, as if by an electron that had passed parallel to the chromonema. (9) The vast majority of the treated genes, both mutant and normal-seeming, remained stable in their inheritance throughout succeeding generations, though at least one case of an "eversporting" condition arose.

Evidence was secured (by making use of non-disjunction) that only one of the two identical genes, or allelomorphs, present in a diploid cell, is caused to mutate at a time. The effect on a given gene, in a haploid germ cell, is "fractional," in that only a fraction of the resulting embryo will receive mutant gene material, the remainder being of normal gene content. Since there is no evidence of an indiscriminate intermingling of the mutant and normal tissues thereby arising, it becomes unlikely that the gene is compounded of many interchangeable members. This is also evidenced by the stability of treated genes in heredity.

Besides gene mutations, frequent rearrangements of gene order—involving inversions, translocations, duplications, etc., of chromosome sections—were found, by genetic evidence, to be produced by X-rays. These provided information concerning various questions. For example, cytological verification of two such cases yielded direct evidence for the physical validity of the linkage maps and of the corollary theory of crossing-over.

H. J. MULLER

JANUARY 8, 1928.

The committee on award this year was composed of the members named below:

Robert J. Terry, *chairman*, professor of anatomy, Washington University, St. Louis, Mo.

L. J. Cole, professor of genetics, University of Wisconsin, Madison, Wis.

William Duane, professor of biophysics, Harvard University, Cambridge, Mass.

G. Canby Robinson, professor of medicine, Vanderbilt University, Nashville, Tenn.

Charles Schuchert, professor of paleontology, Yale University, New Haven, Conn.

To these gentlemen is here expressed the gratitude of the association for their efficient service in this important and delicate part of the association's work.

The complete list of winners of the American Association prize is as follows:

(1) The Cincinnati award, January, 1924. L. E. Dickson, for contributions to the theory of numbers.

(2) The Washington award, January, 1925. Divided equally between Dr. Edwin P. Hubble, for con-

tributions on spiral nebulae, and Dr. L. R. Cleveland, for contributions on the physiology of termites and their intestinal protozoa.

(3) The Kansas City award, January, 1926. Dr. Dayton C. Miller, for contributions on the ether-drift experiment.

(4) The Philadelphia award, January, 1927. Dr. George D. Birkhoff, for mathematical criticism of some physical theories.

(5) The Nashville award, January, 1928. H. J. Muller, for contributions on the influence of X-rays on genes and chromosomes.

Special attention should be called to the purpose for which the prizes are awarded; that is, to stimulate interest in high-class contributions at the annual meetings and to encourage the presentation of the best American scientific work on these occasions. The more noteworthy advances made during the year in every field of knowledge should always be presented at the annual meeting. It is the hope of the donor of the American Association prize that it may serve each year as a concrete and tangible aid to some American science worker, enabling him to go further along his chosen line.

THE NEWS SERVICE AT NASHVILLE

(*Report by Austin H. Clark, News Manager*)

The outstanding feature of the Nashville meeting as compared with previous meetings was the increased interest on the part of the press, an interest which was clearly demonstrated by the high standing in their profession of all the representatives of newspapers, magazines and publishers of books who were in attendance. This increased interest in the proceedings was accompanied by a remarkable increase in the general appreciation of scientific work and a determination to present science to the people in a thoroughly dignified way. Certain aspects of science in the recent past have given rise in Tennessee to a considerable amount of controversy, and it might have been expected that at this meeting the local papers would seize the opportunity of reviving the discussion. Nothing of the sort occurred. On the contrary, the local papers handled a delicate situation in such a masterly way as to give a new broader meaning to the phrases southern courtesy and southern hospitality.

The gentlemen who reported the meeting for the daily papers were the following:

John L. Cooley, science editor, Associated Press.
W. M. Darling, Associated Press, Nashville.
Watson Davis, Science Service.
David Dietz, science editor, Scripps-Howard papers; also representing the NEA Service.
Richard FitzGerald, Jr., Nashville *Tennessean.*
William S. Howland, Nashville *Tennessean;* also representing the United Press and the *Christian Science Monitor.*
Coleman B. Jones, science editor, Associated Press.
Stanley Johnson, Nashville *Banner.*
Waldemar Kaempffert, science editor, New York *Times.*
Allen Shoenfield, Detroit *News.*
E. B. Stahlman, Jr., Nashville *Banner.*
Frank Thone, Science Service.

Of the scientific magazines *Popular Mechanics,* Chicago, was represented by Mr. J. Earle Miller, and *Science* and the *Scientific Monthly* were represented by Professor J. McKeen Cattell and Mr. Jaques Cattell. Mr. Frank Parker Stockbridge examined the material presented at the meeting, with a view to preparing a series of feature articles.

It is worthy of special mention that for the first time the Associated Press was represented by its science editors, and the New York *Times* was also represented by its science editor.

For the first time publishers of scientific books were prominently in evidence. There were present, to look over the situation and to make contracts, Mr. Edward M. Crane, president of the D. Van Nostrand Company, New York; Mr. Robert S. Gill, secretary-treasurer of the Williams and Wilkins Company, Baltimore, and Mr. Charles C. Thomas, of Springfield, Illinois.

The success of the news service at the Nashville meeting was due in no small degree to the energy and ability of the local committee on publicity, of which the chairman was Professor George R. Mayfield, of Vanderbilt University. Professor Mayfield not only handled the preliminary announcements and arrangements for the news service in a very effective way but also throughout the meeting he was daily in touch with the news office, materially assisting the work of the news manager.

The plan of handling the abstracts sent in was the same as that adopted at the Philadelphia meeting last year (see SCIENCE for January 28, 1927, pages 80–81). There were received by the news service altogether 415 abstracts and papers. Of these thirty-seven were mimeographed and the remainder were classified as follows: A, 27; B, 32; C, 91; D, 184; it was not found necessary to mark any of them X this year. No less than forty-four abstracts were received after the papers had been read; because of their lateness these could not be used by the news service. The number of abstracts received was smaller than the number received last year, but this fact in no way represents a falling off of interest in the news service, nor does it indicate any decline in the value of the material presented. The difference is entirely ac-

counted for by the fact that the authors of many highly technical papers, which would be quite unintelligible to the layman, refrained from submitting abstracts.

Thanks to the energy and foresight of Professor Mayfield and to the able assistance of Dr. Frank Thone, an unusually comprehensive radio program was offered in connection with the meeting, which was arranged by the association and Science Service jointly. The talks were as follows:

Friday evening, December 23, Station WSM.—"The Meeting of the American Association for the Advancement of Science at Nashville." Professor George R. Mayfield, Vanderbilt University.

Tuesday evening, December 27, Station WSM.—"Photographing the Planets." Dr. Robert G. Aitken, Lick Observatory.

Wednesday evening, December 28, Station WSM.—"New Miracles with X-rays." Professor Winterton C. Curtis, University of Missouri.

Wednesday evening, December 28, Station WSM.—"The Natural History of Children." Dr. William E. Ritter, president of Science Service.

Thursday evening, December 29, Station WSM.—"The Sea." Austin H. Clark, Smithsonian Institution.

Thursday evening, December 29, Station WBAW.—"Wild Life in Louisiana." Percy Viosca, Jr., state biologist of Louisiana.

Friday evening, December 30, Station WSM.—"Floods of the Mississippi from a Meteorological Standpoint." Dr. Harry C. Frankenfield, U. S. Weather Bureau.

THE GENERAL AND COMPLIMENTARY PROGRAMS

There were nine general sessions of the association at Nashville, and four evening lectures especially arranged for the students and the general public of the city.

The opening session, on Monday evening, December 26, was held in the auditorium of Nashville's beautiful and imposing War-Memorial Building. The convention was opened by Dr. W. S. Leathers, general chairman of the local committees on preliminary arrangements, who introduced Dr. James H. Kirkland, chancellor of Vanderbilt University, and Judge Grafton Green, chief justice of the Supreme Bench of Tennessee. Dr. Kirkland welcomed the scientists on behalf of the educational and scientific institutions of Nashville. Judge Green extended to them the welcome of the state of Tennessee and the city of Nashville.

The chair was then taken by Dr. Arthur A. Noyes of the California Institute of Technology, president of the American Association. In reply to the addresses of welcome, Dr. Noyes delivered an address which will be printed in the next issue of SCIENCE.

The main address of the opening session of the annual meeting is regularly given by the retiring president of the association, who was this year Dr. L. H. Bailey, of Ithaca, N. Y., eminent authority and writer in botanical science, horticulture and rural life and editor of many most useful books of reference. Dr. Bailey was unfortunately unable to be present at Nashville, because of convalescence from a serious illness, but a note from him was read by Dr. W. J. Humphreys, general secretary of the association.

The opening session was completed by an invited lecture on the Mayan remains in Yucatan and Guatemala, by Dr. Sylvanus G. Morley, of the Carnegie Institution of Washington, who gave a fascinating account of his recent excavations. Beautiful and instructive lantern slides were shown.

The general reception followed the opening session. It was held in the Andrew Jackson Hotel and was well attended. Refreshments were served and very enjoyable entertainment was furnished by the Fisk University Singers. These are selected from among the students of Fisk University, of Nashville, the oldest college of liberal arts for Negroes in America. They preserve the unique, simple, spiritual character of the old Negro folk-songs and melodies of the old South. The local committee on entertainment, the chairman of which was Professor A. W. Wright, of Vanderbilt Medical School, merit the thanks of all who attended the reception, which was unusually enjoyable and successful.

For the first time in the history of the annual meetings of the American Association a reception was given Monday evening to Negroes interested in science, by Fisk University, which has been mentioned just above. For this special feature the association is indebted to Dr. Thomas E. Jones, president of Fisk University.

The second general session, Tuesday evening, in the auditorium of the War-Memorial Building, was held jointly, according to custom, with the Society of the Sigma Xi. The sixth annual Sigma Xi Lecture was given on this occasion, by Dr. Clarence Cook Little, president of the University of Michigan, eminent authority and student in the field of genetics and eugenics. The title of his address was "Opportunities for Research in Mammalian Genetics." The lecturer emphasized the great need for intensive research on mammalian genetics, pointing out the certain applications of the results of such research in the improvement of domestic animals and in physiological and psychological genetics as related to human pathology and medicine.

"The Distribution of Scientific Knowledge" was the topic of a symposium occupying both forenoon and afternoon on Wednesday. The several speakers represented the points of view of the investigator,

the journal editor, the book publisher, the writer of scientific feature articles, the press syndicates and the editor of a metropolitan newspaper.

The fifth Josiah Willard Gibbs Lecture of the American Mathematical Society was delivered at a general session on Wednesday afternoon at 4:30. In this session, as in recent years, the association joined with the American Mathematical Society, under the auspices of which the Gibbs lecture is given. The lecturer this year was Professor Ernest W. Brown, eminent mathematician and astronomer, of Yale University. Professor Brown's subject was "Resonance in the Solar System."

"Edward Emerson Barnard, his Life and Work" was the subject of an illustrated lecture by Dr. Robert G. Aitken, of the Lick Observatory, given at the general session Wednesday evening, in the auditorium of the War-Memorial Building. This was the retiring vice-presidential address for Section D (Astronomy). Edward Emerson Barnard was a son of Nashville. Born in this city in 1857, Barnard was graduated from Vanderbilt University in 1886. He made many very valuable contributions to astronomy and was a leader and authority in his field. He died in 1923.

Two general sessions occurred on Thursday afternoon, one presenting a symposium on the "Economic Relations of Science Workers" and the other a symposium on "Aquiculture." The former of these was under the auspices of the association's Committee of One Hundred on Scientific Research, of which Dr. Rodney H. True, of the University of Pennsylvania, is secretary. At this symposium President Noyes gave the opening address, which was followed by papers on the "Relation of Research to Wealth Increase," by Harrison E. Howe; "Comparative Salary Scales of Trained Men," by Rodney H. True; and "Family Budgets of University Faculty Members," by Jessica B. Peixotto. A discussion followed.

The symposium on Aquiculture was arranged under the auspices of the Committee on Aquiculture, recently organized through the National Research Council. The program was in charge of Dr. Robert E. Coker, of the University of North Carolina. Several important papers on various aspects of marine biology were presented. The Committee on Aquiculture invites the counsel and cooperation of those interested in hydrobiological research or in the practical development of aquiculture. It is hoped that botanists, zoologists, geologists, chemists, meteorologists, engineers, economists and others may cooperate to promote the utilization of water areas for the culture of fishes, water birds, crustacea, pearl mussels, fur-bearing mammals, aquatic and swamp plants, etc.

The Thursday evening session was devoted to a lecture on "Science and the Newspapers," by Dr. William E. Ritter, president of Science Service. One of Dr. Ritter's main thoughts in this lecture is expressed as follows: "Science and journalism are both very powerful influences in modern civilization, but they have developed independently in large measure and they are sometimes more or less antagonistic. A study of the work of such men as Benjamin Franklin and Thomas Jefferson, who combined scientific research with ardent support of the newspapers and who mightily influenced our material development, leads to the thought that closer cooperation is needed between the scientists and the journalists."

An illustrated lecture on "Slow-Motion Pictures of Sounds and their Bearing on Speech and the Psychology of Audition" was given at the Friday evening symposium, by Professor Mark H. Liddell, of Purdue University. He presented some of the results of his recent studies on the physics of the sounds of human speech, in which new and highly refined physical methods have been employed. Records of sound waves were shown and different kinds of sounds and noises were produced and compared.

Four non-technical lectures were arranged for the week of the meeting, complimentary to the people of Nashville, including school and college students. These were well attended. The speakers and their topics were as follows:

Tuesday evening. Dr. William M. Mann, director of the National Zoological Park, Washington, D. C. "Collecting Wild Animals for Our National Zoo," with motion pictures.

Wednesday evening. Dr. C. E. K. Mees, director of the research laboratory of the Eastman Kodak Co., Rochester, N. Y. "Production of a Photographic Image," with lantern slides and motion pictures.

Thursday evening. F. R. Moulton, of Chicago. "Science and Civilization."

Friday evening. Mr. Arthur Sterry Coggeshall, curator of education in the Carnegie Museum, Pittsburgh. "Turning Back the Clock Ten Million Years, an account of the Age of Dinosaurs," with slides and motion pictures.

Seven radio talks were given, as shown in the preceding section.

THE COUNCIL ROLL AT NASHVILLE

The affairs of the association are entirely in the charge of the council, which consists of the president, the fifteen vice-presidents, the treasurer, the general secretary, the permanent secretary, the fifteen section secretaries, the council representatives of the affiliated societies and state academies, the eight elected council members and those members of the executive committee who are not otherwise members of the council.

Past presidents of the association and the presidents of the divisions and local branches are officially invited to attend council sessions. The council meets only at the annual meetings of the association. Four sessions were held at Nashville.

The complete roll of the council for the eighty-fourth meeting is shown below, arranged alphabetically. Each member's name is followed by an italic phrase, showing his status in the council. The record of attendance at the four Nashville sessions is shown by numerals that precede the members' names, these numbers representing, respectively, the sessions on Monday, Tuesday, Wednesday, and Thursday, December 26 to December 29. Thus, the numerals 2 and 3 before a name indicate that the member whose name is so marked was present at the Tuesday and Wednesday sessions but was absent from the other sessions. Each member's record of attendance was submitted to him by mail before this list was prepared, with the request that needed corrections be made, but it is possible that a few errors may still require correction. In such cases the permanent secretary's office should be promptly informed. A few substitutes took the places of members who could not come to Nashville, and these are named and so indicated in the list.

MEMBERS AND INVITED GUESTS OF THE COUNCIL FOR THE SECOND NASHVILLE MEETING, WITH NOTES AS TO THEIR STATUS AND RECORDS OF THEIR ATTENDANCE

(Prepared by Sam F. Trelease, secretary of the council.)

Adams, Roger, *Vice-President for Section C.*
Adams, Walter S., *Vice-President for Section C.*
2, 3 Aitken, Robert G., *Rep. Astronom. Soc. Pacific.*
Aldrich, J. M., *Rep. Entomol. Soc. Amer.* (H. E. Ewing, substitute for the Nashville meeting.)
1, 2, 3, 4 Alexander, William H., *Rep. Ohio Acad. Science.*
Anderson, John E., *Rep. Amer. Psychol. Assoc.* (S. C. Garrison, substitute for the Nashville meeting.)
3, 4 Archibald, R. C., *Secretary of Section A.*
1 Ashley, George H., *Rep. Pennsylvania Acad. Science.*
Bailey, L. H., *Past President (1926) and Rep. Bot. Soc. Amer.*
1, 2, 3, 4 Bakke, A. L., *Rep. Honor Soc. Phi Kappa Phi.*
3, 4 Ball, C. R., *Rep. Honor Soc. Phi Kappa Phi.*
Barnes, Harry Elmer, *Vice-President for Section L.*
Barr, A. S., *Secretary of Section Q.*
2, 4 Bartlett, Harley Harris, *Rep. Amer. Soc. Naturalists.*
Bergey, David H., *Rep. Soc. Amer. Bacteriologists.* (H. M. Weeter, substitute for the Nashville meeting.)
Berkey, Charles P., *Rep. Geol. Soc. Amer.*
1 Bishop, E. L., *Rep. Amer. Public Health Assoc.*
Bloom, Lansing B., *President of the Southwestern Division.*
Boose, M. C., *Rep. Amer. Ceramic Soc.*
Boring, Edwin G., *Rep. Amer. Psychol. Assoc.*
Bowman, Isaiah, *Rep. Amer. Geographical Soc.*
Brasch, Frederick E., *Secretary of Section L.*
1, 2, 3, 4 Breckenridge, J. M., *Rep. Amer. Chem. Soc.*
Breed, Robert S., *Rep. Soc. Amer. Bacteriologists.* (H. N. Parker, substitute for the Nashville meeting.)
1 Brown, Harold, *Rep. Amer. Soc. Parasitologists.* (Substitute for M. C. Hall.)
2, 3 Brown, P. E., *Secretary of Section O.*
Buchanan, H. E., *Rep. New Orleans Acad. Sciences.* (Substitute for H. W. Moseley.)
2, 3, 4 Budington, Robert A., *Rep. Amer. Soc. Naturalists.*
1, 2, 3, 4 Cairns, W. D., *Rep. Math. Assoc. Amer.*
Cajori, Florian, *Rep. History Science Soc.*
2, 3 Caldwell, Otis W., *Rep. National Education Assoc.*
3, 4 Call, L. E., *Vice-President for Section O.*
Campbell, W. W., *Past President (1915).*
1, 2 Cattell, J. McKeen, *Exec. Comm. Member and Past President (1924).*
Chamberlin, T. C., *Past President (1908).*
Clinton, G. P., *Rep. Amer. Phytopathol. Soc.*
Coates, Charles E., *Rep. Amer. Oil Chemists' Soc.*
1, 2, 3, 4 Cole, Fay-Cooper, *Secretary of Section H.*
3, 4 Cole, Leon J., *Rep. Amer. Genetic Assoc.*
2, 3, 4 Collingwood, Harris, *Rep. Soc. Amer. Foresters.*
Compton, Arthur H., *Vice-President for Section B.*
Compton, Karl T., *Rep. Amer. Physical Soc. and Optical Soc. Amer.*
Coulter, John Merle, *Rep. Amer. Assoc. Univ. Professors and Past President (1918).*
3 Courtis, Stuart A., *Rep. Nat. Soc. Coll. Teachers Education.*
Crittenden, E. C., *Rep. Illuminating Engineering Soc.*
3, 4 Crocker, William, *Vice-President for Section G.*
1, 2, 3 Cunningham, Bert, *Rep. North Carolina Acad. Science.*
Curtis, W. C., *Rep. Amer. Soc. Zoologists.* (Substitute for H. V. Neal.)
3 Curtiss, Ralph H., *Rep. Amer. Astronom. Soc.*
Dains, F. B., *Rep. History Science Soc.*
3, 4 Dean, George A., *Rep. Amer. Assoc. Econ. Entomol.*
Dellinger, J. H., *Rep. Inst. Radio Engineers.*
Dice, Lee R., *Rep. Amer. Soc. Mammalogists.*
Dickson, L. E., *Elected Member.*
2, 3, 4 Dietrichson, Gerhard, *Secretary of Section C.*
Dorsey, Maxwell Jay, *Rep. Amer. Soc. Horticultural Science.*
4 Downing, E. R., *Rep. Nat. Education Assoc.* (Substitute for O. W. Caldwell.)
Dresden, Arnold, *Rep. Amer. Math. Soc.*
3, 4 Drushel, J. Andrew, *Rep. Amer. Nature-Study Soc.*
1 Dunlap, Knight, *Vice-President for Section I.*
Dunn, Gano, *Rep. Amer. Inst. Electrical Engineers.*
1, 2 Eaton, S. V., *Rep. Amer. Soc. Plant Physiologists.* (Substitute for R. P. Hibbard.)
Ellery, Edward, *Rep. Sigma Xi.*
1, 2, 3, 4 Enders, Howard E., *Rep. Indiana Acad. Science.*
Estabrook, Arthur H., *Rep. Eugenics Research Assoc.*
4 Ewing, H. E., *Rep. Entomol. Soc. Amer.* (Substitute for J. M. Aldrich.)
Faig, John T., *Rep. Amer. Soc. Mechanical Engineers.*
1, 2, 3, 4 Fairchild, H. L., *Exec. Comm. Member.*
3, 4 Fenneman, N. M., *Rep. Assoc. Amer. Geographers.*
Flexner, Simon, *Past President (1919).*

3 Flint, W. P., *Rep. Illinois Acad. Science.*
Focke, T. M., *Rep. Math. Assoc. Amer.*
3 Fort, Tomlinson, *Rep. Amer. Math. Soc.*
1, 2, 3 Fox, Philip, *Secretary of Section D and Rep. Amer. Astronom. Soc.*
1, 2, 3 Freeman, Frank N., *Secretary of Section I and Rep. Nat. Soc. Study of Education.*
Garber, R. J., *Rep. Amer. Soc. Agronomy.* (M. M. Hoover, substitute for the Nashville meeting.)
1, 2, 3, 4 Gardner, Wright A., *Rep. Alabama Acad. Science.*
Garrison, S. C., *Rep. Amer. Psychol. Assoc.* (Substitute for John E. Anderson.)
Gates, Arthur I., *Vice-President for Section Q.*
Giddings, N. J., *Rep. West Virginia Acad. Science.*
1 Glenn, Leonidas C., *Rep. Amer. Inst. Mining and Metallurgical Engineers.* (Substitute for G. R. Mansfield and for David White.)
2, 3, 4 Goldforb, A. J., *Secretary of Section N and Rep. Soc. Exp. Biology and Medicine.*
Good, E. S., *Rep. Amer. Soc. Animal Production.* (Substitute for E. W. Sheets.)
Goode, J. Paul, *Rep. Assoc. Amer. Geographers.*
2, 3, 4 Guthe, C. E., *Rep. Amer. Anthropol. Assoc.*
Guy, J. Sam, *Rep. Georgia Acad. Science.* (T. H. McHatton, substitute for the Nashville meeting.)
Hall, M. C., *Rep. Amer. Soc. Parasitologists.* (Harold Brown, substitute for the Nashville meeting.)
3, 4 Hargitt, Geo. T., *Secretary of Section F.*
1, 2, 3, 4 Harnly, Henry J., *Rep. Kansas Acad. Science.*
Harper, Robert Almer, *Rep. Torrey Bot. Club.* (A. B. Stout, substitute for the Nashville meeting.)
Harris, J. Arthur, *Rep. Torrey Bot. Club.*
Harshberger, John W., *Rep. Ecol. Soc. Amer.*
Hartwell, Burt L., *Rep. Amer. Soc. Agronomy.* (Forman T. McLean, substitute for the Nashville meeting.)
2, 4 Heck, N. H., *Secretary of Section M.*
Hedrick, William A., *Rep. Amer. Fed. Teachers of Math. and Nat. Sciences.*
2, 3, 4 Herrick, Glenn W., *Rep. Amer. Assoc. Econ. Entomol.*
Hess, Alfred F., *Rep. Soc. Exp. Biology and Medicine.*
Hibbard, R. P., *Rep. Amer. Soc. Plant Physiologists.* (S. V. Eaton and C. A. Shull, substitutes for the Nashville meeting.)
3, 4 Hoover, M. M., *Rep. Alabama Acad. Science.* (Substitute for R. J. Garber.)
2, 3, 4 Howard, L. O., *Elected Member and Past President (1920).*
4 Hughes, A. L., *Secretary of Section B.*
1, 2, 3, 4 Humphreys, W. J., *General Secretary of the Association and Rep. Amer. Meteorol. Soc.*
4 Jackson, Dunham, *Vice-President for Section A.*
Joerg, W. L. G., *Rep. Amer. Geographical Soc.*
Jones, Lauder W., *Rep. Amer. Chem. Soc.*
Jordan, David Starr, *Past President (1909).*
3, 4 Juday, Chancey, *Rep. Wisconsin Acad. Sciences.*
Keith, Arthur, *Rep. Geol. Soc. Amer.*
Kellogg, Vernon, *Exec. Comm. Member.*
Kemp, W. W., *Rep. Nat. Soc. Coll. Teachers Education.*
Kober, George M., *Rep. Amer. Medical Assoc.*
Koch, Julius A., *Rep. Amer. Pharmaceutical Assoc.*
Kofoid, Charles A., *President of the Pacific Division.*
Laughlin, H. H., *Rep. Eugenics Research Assoc.*
Leathers, W. S., *Vice-President for Section K and rep. Amer. Public Health Assoc.*
Leighty, C. E., *Rep. Amer. Genetic Assoc.*
2, 3, 4 Lewis, I. F., *Rep. Bot. Soc. Amer.*
Lidbury, F. A., *Rep. Amer. Electrochem. Soc.*
1, 2, 3, 4 Livingston, Burton E., *Permanent Secretary of the Association.*
3, 4 Lloyd, Francis E., *Rep. Amer. Soc. Plant Physiologists.*
Loomis, F. B., *Rep. Paleontological Soc. Amer.*
2, 3, 4 Lutz, Frank Eugene, *Rep. Amer. Soc. Zoologists.*
1, 3, 4 Lyon, Marcus Ward, Jr., *Rep. Amer. Soc. Mammalogists.*
MacDougal, D. T., *Elected Member.*
1, 2, 4 Macelwane, James B., *Rep. Seismol. Soc. Amer.*
Mansfield, G. R., *Secretary of Section E.* (Leonidas C. Glenn, substitute for the Nashville meeting.)
McClung, C. E., *Vice-President for Section F.*
1, 2, 3, 4 McGill, John T., *Rep. Tennessee Acad. Science.*
1, 2, 4 McHatton, T. H., *Rep. Georgia Acad. Science.* (Substitute for J. Sam Guy.)
2 McLean, Forman T., *Rep. Amer. Soc. Agronomy.* (Substitute for Burt L. Hartwell.)
McMurrich, J. Playfair, *Rep. Amer. Assoc. Anatomists, and Past President (1922).*
Merriam, John C., *Elected Member.*
3, 4 Metcalf, Clell Lee, *Rep. Entomol. Soc. Amer.*
3, 4 Metcalf, Z. P., *Rep. Amer. Microscopical Soc.*
Michelson, A. A., *Past President (1910).*
3, 4 Michelson, Truman, *Rep. Amer. Anthropol. Assoc.*
1, 3, 4 Middleton, Austin R., *Rep. Kentucky Acad. Science.*
1, 2, 3, 4 Miller, E. C. L., *Rep. Amer. Electrochem. Soc.*
Mitchell, S. A., *Rep. Amer. Assoc. Univ. Professors.*
Moore, E. H., *Past President (1921).*
1, 2, 3, 4 Morehouse, D. W., *Rep. Iowa Acad. Science.*
Moseley, H. W., *Rep. New Orleans Acad. Sciences.* (H. E. Buchanan, substitute for the Nashville meeting.)
2, 3, 4 Moulton, F. R., *Exec. Comm. Member and Rep. Sigma Xi.*
Neal, H. V., *Rep. Amer. Soc. Zoologists.* (W. C. Curtis, substitute for the Nashville meeting.)
Nicholas, Francis C., *Rep. Maryland Acad. Sciences.*
Nichols, E. L., *Past President (1907).*
1, 3, 4 Noyes, A. A., *President of the Association.*
1, 2, 3 Noyes, W. A., *Exec. Comm. Member.*
1, 3 O'Kane, Walter C., *Rep. New Hampshire Acad. Science.*
3 Okkelberg, Peter, *Rep. Michigan Acad. Science.*
Oldfather, W. A., *Elected Member.*
1, 2, 3, 4 Osburn, Raymond C., *Rep. Ecol. Soc. Amer.*
Parker, H. N., *Rep. Soc. Amer. Bacteriologists.* (Substitute for Robert S. Breed.)
1, 2 Patterson, Herbert, *Rep. Oklahoma Acad. Science.*
Piersol, George M., *Rep. Amer. Medical Assoc.*
Pratt, Joseph H., *Rep. Amer. Soc. Civil Engineers.*
Pupin, M. I., *Exec. Comm. Member, Rep. Amer. Inst. Electrical Engineers, and Past President (1925).*
Reddick, Donald, *Rep. Amer. Phytopath. Soc.*
Richards, C. R., *Rep. Amer. Soc. Mechanical Engineers.*
Richards, Theodore W., *Past President (1917).*
Richtmyer, F. K., *Rep. Optical Soc. Amer.*
Robinson, G. Canby, *Vice-President for Section N.*
3, 4 Salter, R. M., *Rep. Amer. Soc. Agronomy.*

1 Sanders, George E., *Rep. Canadian Soc. Tech. Agriculturists.*
4 Sapir, Edward, *Rep. Linguistic Soc. Amer.*
Sauveur, Albert, *Rep. Amer. Inst. Mining and Metallurgical Engineers.*
Schroeder, E. C., *Rep. Amer. Veterinary Med. Assoc.*
4 Schuchert, Charles, *Vice-President for Section E.*
Senior, H. D., *Rep. Amer. Assoc. Anatomists.*
Sharp, Clayton H., *Rep. Illuminating Engineering Soc.*
Sheets, E. W., *Rep. Amer. Soc. Animal Production.* (E. S. Good, substitute for the Nashville meeting.)
1, 3, 4 Shull, C. A., *Rep. Amer. Soc. Plant Physiologists.* (Substitute for R. P. Hibbard.)
Stewart, G. W., *Elected Member.*
4 Stout, A. B., *Rep. Torrey Bot. Club.* (Substitute for R. A. Harper.)
Studebaker, J. W., *Rep. National Education Assoc.*
4 Talbot, A. N., *Vice-President for Section M.*
1, 2, 3, 4 Terry, R. J., *Vice-President for Section H.*
Townley, S. D., *Rep. Seismol. Soc. Amer.*
1, 2, 3, 4 Trelease, Sam F., *Secretary of Section G.*
4 True, Rodney H., *Elected Member.*
3, 4 Van Cleave, H. J., *Rep. Amer. Microscopical Soc.*
Van Horn, Frank R., *Rep. Mineralogical Soc. Amer.*
1 Waddell, John A. L., *Rep. Amer. Soc. Civil Engineers.*
1, 2, 3, 4 Ward, Henry B., *Exec. Comm. Member.*
Warwick, C. L., *Rep. Amer. Soc. Testing Materials.*
Weaver, John Ernst, *Rep. Nebraska Acad. Science.*
Webb, Harold W., *Rep. Amer. Physical Soc.*
Weeter, H. M., *Rep. Soc. Amer. Bacteriologists.* (Substitute for David H. Bergey.)
Welch, William H., *Past President (1906).*
Whipple, Guy M., *Rep. Nat. Soc. Study of Education.*
White, David, *Elected Member and Rep. Paleontological Soc. Amer.* (Leonidas C. Glenn, substitute for the Nashville meeting.)
Wilson, Edmund B., *Past President (1913).*
Wilson, Edwin B., *Exec. Comm. Member.*
Wirt, John L., *Treasurer of the Association.*

THE ROLL OF THE EXECUTIVE COMMITTEE AT NASHVILLE*

The executive committee held sessions on Monday, Tuesday and Wednesday mornings. The first session was in the Andrew Jackson Hotel, while the others were in the council room in the Industrial Arts Building, George Peabody College for Teachers. Following is the roll of the committee. The numbers preceding each name indicate the sessions at which the member was present, as in the case of the council roll above. The number in parenthesis after each name denotes the calendar year at the end of which the member's term of office was to expire. Dr. H. L. Fairchild and Dr. W. A. Noyes automatically retired from the committee at the end of this Nashville meeting, and Dr. John Johnston, U. S. Steel Corporation, New York City, and Dr. David R. Curtiss, Northwestern University, were elected as their successors.

1, 2 J. McKeen Cattell (1930), *chairman*, Garrison-on-Hudson, N. Y.
1, 3 A. A. Noyes (1927), president of the association, Pasadena, Calif.
1, 2 W. J. Humphreys (1928), general secretary of the association, Washington, D. C.
1, 2, 3 Burton E. Livingston (1928), permanent secretary of the association, Baltimore, Md., and Washington, D. C.
1, 2, 3 H. L. Fairchild (1927), Rochester, N. Y.
Vernon Kellogg (1928), Washington, D. C.
3 F. R. Moulton (1929), Chicago, Ill.
1, 3 W. A. Noyes (1927), Urbana, Ill.
M. I. Pupin (1929), New York City.
1, 2, 3 H. B. Ward (1930), Urbana, Ill.
Edwin B. Wilson (1928), Boston, Mass.

* The number in parenthesis denotes the year at the end of which the member's term of office was to expire.

LEGISLATIVE AND EXECUTIVE PROCEEDINGS AT NASHVILLE

The executive committee of the council met in the Andrew Jackson Hotel on Monday morning, December 26, and held two other sessions, in the council room, Industrial Arts Building, George Peabody College for Teachers, on Tuesday and Wednesday mornings, following the council sessions. The council met at the Andrew Jackson Hotel on Monday afternoon, December 26, and in the council room on Tuesday, Wednesday and Thursday mornings. No business was transacted at any of the general sessions at Nashville. The following paragraphs summarize the business proceedings at this meeting:

(1) The council minutes of December 31, 1926, and of December 26, 27 and 28, 1927, were read and approved by the council.

(2) The audited report of the treasurer for the fiscal year ending September 30, 1927, was accepted by the council and ordered to be printed in SCIENCE in the usual manner. It appears elsewhere in this issue of SCIENCE.

(3) The audited financial report of the permanent secretary, for the association year ending September 30, 1927, was accepted and ordered printed in SCIENCE. It also appears elsewhere in the present issue.

(4) The following appropriations were made from the treasurer's funds available for the current year:

For journal subscriptions for 418 life members	$1,254.00
For life-membership fees of three emeritus life members, on account of the Jane M. Smith Fund for this special purpose	300.00
For rental of treasurer's safety-deposit box	20.00
For grants for research, to be allotted by the Committee on Grants	3,000.00
To the Naples Zoological Station	500.00
To the Annual Tables of Physical and Chemical Constants	200.00

To these should be added an appropriation of $100 to the National Conference on Outdoor Recreation, author-

zed by the executive committee at its recent autumn meeting and now reported to the council, and the total of appropriations from the treasurer's funds for the current year therefore amounts to $5,374. There remains an unappropriated balance of treasurer's funds available for the current year, amounting to $1,411.45. It is possible that about $1,200 of this balance may be appropriated for the use of the Committee of One Hundred on Scientific Research, but that matter is left in the hands of the executive committee, with power, because no report and proposed budget for the Committee of One Hundred was received in time for action at Nashville.

(5) The following members were elected to emeritus life membership according to the provisions of the will of the late Jane M. Smith:

Frank A. Gooch (joined in 1876, elected to fellowship in 1880), 291 Edwards St., New Haven, Conn. A.B., Harvard, 1872; A.M., Ph.D., 1877; Ph.D., Vienna, 1875–76; honorary A.M., Yale, 1887. Professor of chemistry and director of the Kent Chemical Laboratory, Yale University, 1885–1918; emeritus professor since 1918.

Alfred Springer (joined in 1875, elected to fellowship in 1880), 312 East 2nd St., Cincinnati, Ohio. Ph.D., Heidelberg, 1872; secretary, Section C, 1882; assistant general secretary, 1883; general secretary, 1884; vice-president for Section C, 1892.

Warren Upham (joined in 1876, elected to fellowship in 1880), Minnesota Historical Society, St. Paul, Minn. A.B., Dartmouth, 1871; honorary A.M., Dartmouth, 1894; Sc.D., Dartmouth, 1906. Has held positions with the New Hampshire Geological Survey, the Minnesota Geological Survey, the U. S. Geological Survey and the Western Reserve Historical Society. Archeologist of the Minnesota Historical Society since 1914.

(6) The council established a committee to look into the question of securing American funds for the Naples Zoological Station, the committee to consist of Edmund B. Wilson, Henry B. Ward and a third member named by these two.

(7) The council expressed its great appreciation of the very valuable services rendered by Dr. Sam F. Trelease, program editor, and by Mrs. Trelease. Special mention was made of the complete index of speakers' names, which this year, for the first time, is part of the general program. Day and night for two weeks preceding the opening of the meeting Doctor and Mrs. Trelease devoted themselves to the very arduous task of getting the program printed on time. The book was completed Saturday, December 24. An honorarium of $200 was voted to the program editor on account of his efficient work on the Nashville general program.

(8) Eighty fellows were elected by the council, distributed among the several sections as follows:

Section A (Mathematics)	1	Section I (Psychology)	1
Section C (Chemistry)	3	Section M (Engineering)	22
Section E (Geology and Geography)	2	Section N (Medical Sciences)	11
Section G (Botanical Sciences)	35	Section O (Agriculture)	5

(9) By action of the council the newly formed Colorado-Wyoming Academy of Science was officially affiliated with the American Association, with the financial provision that both an academy allowance and a division allowance are not to be paid for the same member in any case.

(10) The executive committee was authorized by the council to arrange, in connection with each annual meeting of the association, an academy conference and the council approved of the following named officers of the conference for the current year: Chairman, William H. Alexander, U. S. Weather Bureau, Columbus, Ohio; secretary, Howard E. Enders, Purdue University, LaFayette, Ind.

(11) The permanent secretary was asked to make a study of the problem of the extra journals (*The Scientific Monthly* and the *Science News-Letter*), with the advice and assistance of Dr. Cattell and Dr. Kellogg, and to present at a later meeting of the executive committee suggestions for improvements in arrangements for these journals.

(12) A special telegram was sent to the secretary of each associated organization meeting at this time elsewhere than in Nashville, inviting the organization to hold sessions at the New York meeting next year.

(13) It was voted by the council that men of science from outside of the United States and Canada who are members of scientific associations in their own countries are to be appointed honorary associates if they attend an annual meeting of the American Association, the associate fee and the registration fee being remitted in such cases.

(14) Resignations were presented, and accepted by the council, from the section secretaries named below, the reason for the resignation being, in all three cases, the press of other work: Raymond C. Archibald, secretary of Section A (Mathematics); Frederick E. Brasch, secretary of Section L (Historical and Philological Sciences); A. J. Goldforb, secretary of Section N (Medical Sciences).

(15) It was voted that the spring meeting of the executive committee of the council shall regularly occur at Washington, D. C., on the Sunday preceding the spring meeting of the National Academy of Sciences.

(16) The executive committee appointed Arthur A. Noyes a committee of one to consider possible improvements in the procedure for awarding the American Association prize and to send to the permanent secretary at an early date suggestions for such possible improvements.

(17) On recommendation by the executive committee, the council voted that the annual meeting of December, 1929, is to be held at Des Moines, Iowa, on invitation of Drake University and the Des Moines Chamber of Commerce.

(18) The executive committee instructed the permanent secretary to study and report on the possibilities of holding the meeting of December, 1930, in Montreal. That meeting has been tentatively set for Cleveland, but no definite arrangements have yet been made and the committee noted the desirability of holding an annual meeting in Canada in the near future.

(19) The executive committee named a special committee, consisting of J. McK. Cattell, Burton E. Livingston and Sam F. Trelease, to decide upon the general-headquarters hotel for the New York meeting next year.

(20) The executive committee voted that the registration fee for the New York meeting shall be two dollars, one dollar being remitted to members in good standing of the American Association for the Advancement of Science.

(21) The council adopted a resolution favoring the maintenance of the highest standards in the system of the national parks of the United States. This resolution appears elsewhere in this issue of SCIENCE.

(22) The council adopted a resolution favoring the establishment of wild-life experiment stations in the United States. This resolution appears elsewhere in this issue of SCIENCE.

(23) The following resolution was adopted by the council:

Resolved: That the American Association for the Advancement of Science approves of the project, brought to its attention by Dr. Gregory D. Walcott, for the publication of source-books in the history of science, and names a committee of three to cooperate with the advisory board for this project, the members of the committee to be Gregory D. Walcott, Edwin G. Conklin and Harlow Shapley.

(24) A report of the Committee on the Place of Science in Education was presented to the council, a summary of which appears elsewhere in this issue of SCIENCE. The report was accepted and the council authorized the committee to publish a more complete report, which is being prepared, this publication to be financed without drawing on association funds other than those specially designated for the use of the Committee on the Place of Science in Education.

(25) The council authorized the Committee on Place of Science in Education to proceed with its plans for a comprehensive and cooperative study of educational systems and for the development of a council of science teachers, it being understood that these projects are to be financed without drawing on association funds other than those specially designated for the use of the Committee on the Place of Science in Education.

(26) The council named a committee of four to investigate and report on the relation of existing tariff laws in the United States to scientific research, the committee to consist of Edward B. Mathews, Johns Hopkins University; Austin H. Clark, Smithsonian Institution; William A. Noyes, University of Illinois; and Frederick E. Wright, Geophysical Laboratory, Washington, D. C.

(27) The council named a committee of four to investigate and report on the project, suggested by Mr. Joseph L. Wheeler, of supplying to libraries and the general public lists of recommended books on science, the committee to consist of Joseph L. Wheeler, Enoch Pratt Library, Baltimore; Edward W. Berry, Johns Hopkins University; Burton E. Livingston, Johns Hopkins University; and Robert B. Sosman, Carnegie Institution of Washington.

(28) The council unanimously elected Dr. Henry Fairfield Osborn, president of the Museum of Natural History, New York City, as president of the American Association for the Advancement of Science.

(29) On nominations received in the regular way from the respective section committees, the association vice-presidents for the following named sections were unanimously elected for the ensuing year: Section A (Mathematics), Raymond C. Archibald; Section B (Physics), P. W. Bridgman; Section C (Chemistry), C. E. K. Mees; Section D (Astronomy), J. S. Plaskett; Section E (Geology and Geography), Frank Leverett; Section F (Zoological Sciences), M. F. Guyer; Section G (Botanical Sciences), Charles E. Allen; Section H (Anthropology), Fay-Cooper Cole; Section I (Psychology), Howard C. Warren; Section M (Engineering), Robert Lemuel Sackett; Section O (Agriculture), C. A. Mooers; Section Q (Education), Truman L. Kelley.

(30) On nominations received from the respective section committees, the council unanimously elected the three section secretaries named below, their terms of office to expire at the end of the New York meeting next year: Secretary of Section A (Mathematics), Charles N. Moore; secretary of Section N (Medical Sciences), James Harold Austin; secretary of Section H (Anthropology), C. H. Danforth. The secretaries of Sections A and N had resigned, as noted above, and the election of a secretary of Section H was made necessary by the election of Dr. Fay-Cooper Cole (who has been secretary) as vice-president for the section.

(31) On nominations presented by a nominating committee, the council unanimously elected two members of the council, two members of the executive committee, two members of the committee on grants and one member of the finance committee, in accordance with provisions of the Constitution, the terms of office of these to expire at the end of December, 1931. The names of those elected are as follows:

Elected council members: Arthur H. Compton, University of Chicago, and Austin H. Clark, Smithsonian Institution. These succeed W. A. Oldfather and G. W. Stewart, whose terms expired at the end of this meeting.

Members of executive committee: John Johnston, U. S. Steel Corporation, New York City, and David R. Curtiss, Northwestern University. These succeed H. L. Fairchild and W. A. Noyes, whose terms expired at the end of this meeting.

Members of the Committee on Grants: Walter S. Adams (representing astronomy), Mount Wilson Observatory, and Karl F. Kellerman (representing botanical sciences), U. S. Department of Agriculture. These succeed A. Hrdlička and B. M. Davis, whose terms expired at the end of this meeting.

Member of the Finance Committee, Arthur L. Day, Geophysical Laboratory, Washington, D. C., who was elected to succeed himself.

(32) The council unanimously nominated Dr. J. McK. Cattell to succeed himself as representative of the American Association in the board of trustees of Science Service.

(33) The next meeting of the executive committee will occur at the Cosmos Club, in Washington, on Sunday, April 22, 1928. The next meeting of the council will occur at New York on Thursday, December 27, 1928.

RESOLUTIONS BEARING ON THE PUBLIC WELFARE ADOPTED BY THE COUNCIL AT NASHVILLE, DECEMBER 28, 1927

A Resolution on the Maintenance of the Highest Standards in the System of the National Parks of the United States.

Resolved: That the American Association for the Advancement of Science

(1) Approves the creation of those national parks only which meet the highest standards of the system, namely, which are wholly or almost wholly areas of original, unmodified natural conditions, each a unique example of its landscape or geologic type in the country; and

(2) Declares that, as the only reservational system for preservation of the primitive and majestic in nature, the protection inviolate of the system of national parks demands extraordinary watchfulness and care; and

(3) Recognizes that, by reason of its peculiar limitations and conditions, the system of national parks possesses facilities for popular education in nature and for inspiration, which have incalculable value to individuals and the nation.

A Resolution Favoring the Establishment of Wild-Life Experiment Stations in the United States.

Resolved: That the American Association for the Advancement of Science recommends the establishment of wild-life experiment stations for the better conservation, development and utilization of the wild-life resources of our national parks and forests, such stations to be established and supported by federal, state or private agencies or some combination of these.

THE ANNUAL CONFERENCE OF SECTION AND SOCIETY SECRETARIES

(Based on minutes furnished by Geo. T. Hargitt, Secretary of the Nashville Conference)

The secretaries of the sections and of the associated societies meeting with the American Association at Nashville, together with the members of the executive committee of the association council, the executive assistant and the news manager, held the annual secretaries' conference at the Andrew Jackson Hotel on the evening of Friday, December 30, following a complimentary dinner provided by the association for this occasion. There were twenty-two in attendance, but a few left early because they were returning home that night. Many questions of the management of the association and of the relation of the association to the associated organizations were discussed and the conference was even more satisfactory and profitable than any of the earlier ones. The custom of holding this conference in connection with the annual meeting each year, inaugurated at the second Toronto meeting, in December, 1921, is now well established. It furnishes opportunity for bringing together those who have to do with the organization and work of the association, especially in relation to the associated organizations. Dr. Geo. T. Hargitt, secretary for Section F (Zoological sciences), served as secretary of the secretaries' conference. He was requested to prepare a program of topics for discussion at the New York conference next year, by means of correspondence with the other members. The secretaries' conference thus becomes, in a sense, perpetual, and continues throughout the year. Further notes concerning its problems are to be published in SCIENCE from time to time.

The secretaries' conference adopted the following resolutions of appreciation.

(1) *Resolved:* That the secretaries' conference at Nashville requests the permanent secretary to express to President A. A. Noyes the appreciative thanks of the association and the associated societies for the fine and efficient manner in which he has presided at the council sessions and at general sessions of the association at Nashville and has performed the other duties of his office as president.

(2) *Resolved:* That the secretaries' conference at Nashville requests the permanent secretary to convey to the institutions of Nashville that have so generously taken part in making this meeting such a pronounced success, an expression of the grateful appreciation of the association and the associated organizations.

(3) *Resolved:* That the conference of association and society secretaries asks the permanent secretary to express the gratitude of the association and of the associated organizations to the members of the local committees on arrangements for this meeting, without whose very efficient preliminary work the meeting could not have occurred.

(4) *Resolved:* That the conference of association and society secretaries asks the permanent secretary to thank heartily the editors of the local newspapers and the press representatives from away who covered the Nashville meeting, for the very excellent and extensive publicity given to this meeting.

REPORT OF THE TREASURER FOR 1926–27

In accordance with the provision of Article III, Section 6, of the By-Laws, the treasurer respectfully submits herewith the following report for the fiscal year ending September 30, 1927.

Collections from all sources during the year amounted to $31,874.78. Included in the amount are the following items:

Payment of a mortgage held by the association on a real estate loan	$20,000.00
Additional donation to the Prize Fund by the original donor, thus guaranteeing the Prize Award for the next five years	3,000.00
Sixteen Life Membership fees, increasing the endowment fund by a like amount	1,600.00

Disbursements made in accordance with direction of the council and executive committee amount, in the aggregate, to $6,366.18, including the $1,000 Prize awarded to Dr. George D. Birkhoff at the fifth Philadelphia meeting.

A reserve fund of $4,364.08 was established in conformity with a resolution adopted by the council December 27, 1926.

The total amount of funds of the association, consisting of contributions received from Richard T. Colburn, W. Hudson Stephens, Friends of Association, Sustaining and Life Memberships, Jane M. Smith and Prize Fund, is $159,075.01.

The details of receipts, disbursements and disposition of funds are shown in the following itemized statements.

Respectfully submitted,

(*Signed*) JOHN L. WIRT,
Treasurer.

Washington, D. C.
October 1, 1927.

CASH STATEMENT

October 1, 1926–September 30, 1927

Receipts

1926 Oct. 1	Balance from last report		$ 12,242.47
	Redemption of mortgage		20,000.00
	Addition to Prize fund		3,000.00
	Revertments (credited to reserve fund):		
	Moyer S. Fleisher grant	$ 200.00	
	W. F. G. Swann grant	196.00	
	Accumulated interest purchased	93.33	489.33
	16 life-membership fees		1,600.00
	Interest on Jane M. Smith fund	300.00	
	Interest on mortgage	1,020.00	
	Interest on other securities	4,983.42	
	Interest on bank balance	482.03	6,785.45
			$44,117.25

Disbursements

Grants for 1927, allotted by Committee on Grants:		
William H. Cole	$ 150.00	
Henry B. Collins, Jr.	350.00	
Bruce Fink	300.00	
Jacob Kunz	200.00	
Ann Morgan	150.00	
Knight H. Dunlap	300.00	
J. G. Frayne	150.00	
S. O. Mast	300.00	
J. G. Frayne	150.00	2,050.00
Allotments by council or executive committee:		
Naples Zoological Station	$ 500.00	
International Annual Tables	200.00	
Concilium Bibliographicum	200.00	
Committee of One Hundred	551.18	
Thomas Barbour (for Barro Colorado Laboratory)	300.00	1,751.18
Philadelphia Prize (George D. Birkhoff)		1,000.00
Three emeritus life memberships (Jane M. Smith fund)		300.00
415 Journal subscriptions for life members		1,245.00
Safe-deposit box for securities		20.00
		6,366.18
Cash in bank		37,751.07
		$44,117.25

BALANCE SHEET, SEPTEMBER 30, 1927

Assets

Investments:		
Endowment and reserve funds	$121,323.94	
Cash awaiting investment	25,516.80	$146,840.74
Current assets:		
Income account, cash available	7,234.27	
Prize fund	5,000.00	12,234.27
		$159,075.01

Liabilities

Endowment and reserve funds:		
General:		
W. Hudson Stephens	$ 4,381.21	
Richard T. Colburn	85,586.45	
Friends of Association	3,559.00	
Sustaining-membership fees	6,000.00	
Life-membership fees	37,950.00	
Jane M. Smith fund	5,000.00	
Reserve fund	4,364.08	146,840.74
Current Liabilities:		
Balance of $1,000 appropriated for Committee of One Hundred	448.82	
Prize fund	5,000.00	5,448.82
Accumulated income, unappropriated (cash in bank)		6,785.45
		$159,075.01

AUDITOR'S REPORT

I certify that I have audited the accounts of the treasurer of the American Association for the Advancement of Science for the period October 1, 1926, to September 30, 1927. The securities representing the investments of the association, as listed in the treasurer's report to the council, have been exhibited and verified with the exception of the Pittsburgh, Shawmut & Northern bonds, which were represented by a certificate of deposit, and $10,500 worth of U. S. Second Liberty Loan bonds, which had been deposited for redemption and were represented by a receipt. The income from all investments was duly accounted for. The financial statements accompanying the report of the treasurer were in accord with the books of the association and correctly summarized the accounts.

(*Signed*) ROBERT B. SOSMAN,
Auditor.

Washington, D. C.,
November 22, 1927.

NOTES ON THE TREASURER'S REPORT

The permanent secretary calls attention to the fact that, omitting the Jane M. Smith fund for emeritus life membership (which has a capital of $5,000 and draws interest at the rate of 6 per cent.), the average rate of interest received for the fiscal year 1926–27 is 4.77 per cent. The income for the year may be classified, according to the several funds in the treasury, as follows:

W. Hudson Stephens fund	$ 209.13
Richard T. Colburn fund	4,085.04
"Friends of Association" fund	169.79
Sustaining-membership fees (living members)	143.22
Sustaining-membership fees (deceased members)	143.22
Life-membership fees (living members)	1,317.38
Life-membership fees (deceased members)	417.67
Jane M. Smith fund	300.00
Total income available for use in 1927–28	$6,785.45

Of the last amount, $5,374.00 has now been appropriated (see "Proceedings at Nashville," above), leaving a balance available for further appropriations this year amounting to $1,411.45. The treasurer's reserve amounts to $4,364.08, available for emergencies.

FINANCIAL REPORT OF THE PERMANENT SECRETARY FOR THE FISCAL YEAR 1926–27

(October 1, 1926, to September 30, 1927)

Dr.

To balance from last account:		
*Publication fund	$ 1,000.00	
*Special fund for Committee on Place of Science in Education	848.93	
*Emergency fund	5,000.00	
*Available for general purposes	2,025.68	$ 8,874.61
To receipts from membership dues:		
Annual dues previous to 1926	$ 80.00	
Annual dues for 1926	715.00	
Annual dues for 1927	67,527.77	
Annual dues for 1928	720.50	
Entrance fees	655.00	
Life-membership fees	1,600.00	71,298.27
To other general receipts:		
Life-membership Journal subscriptions (from the treasurer)	$ 1,245.00	
Interest on bank accounts	649.03	
Contribution from member	25.00	
Sale of Proceedings volume	293.75	
Miscellaneous receipts	332.60	
Overpayments, etc.	255.72	2,801.10
To special journal subscriptions:		
SCIENCE and *Scientific Monthly*	$ 2,509.38	
Science News-Letter	8,022.00	10,531.38
To receipts from members for Agassiz Bust fund		1,310.00
To receipts from treasurer for Committee of One Hundred		551.18
To receipts for Joint Committee on Promotion of Research in Colleges:		
From A. A. A. S. Committee of One Hundred	$ 300.00	
From National Research Council, Division of Educational Relations	100.00	
From American Council on Education	100.00	500.00
Bank interest on special fund for Committee on Place of Science in Education		33.96
Philadelphia Meeting:		
Fund raised by local committee	$ 4,027.25	
Registration fees	1,303.00	
Sale of programs	10.50	
Sale of advertising space in program	425.00	
Exhibition:		
Receipts from exhibitors	3,591.50	
Donations	500.00	9,857.25
Nashville Exhibition:		
Receipts from exhibitors		868.97
		$106,626.72

Cr.

By subscriptions to official journal		$ 42,610.75
By Division, Local Branch, and Academy allowances:		
Pacific Division	$ 1,613.00	
Southwestern Division	264.00	
State College (Pa.) Local Branch	14.25	
Affiliated state academies	1,195.50	3,086.75
By expenses, General Secretary		4.75
By expenses, Washington Office:		
Salaries	$12,330.96	
Office and addressograph supplies	307.96	
Printing and stationery	1,528.32	
Telephone and telegraph	159.91	
Postage, correspondence and billing	1,805.98	
Exchange	26.09	
Express, freight and drayage	47.73	
Notary fees	1.00	
Furniture and equipment	525.54	
Miscellaneous expense	328.93	17,062.42
By Circularization		2,314.72
By miscellaneous expenses:		
Life-membership fees (to treasurer)	$ 1,600.00	
Refunds of overpayments, etc.	255.72	
Contribution of American Institute of Sacred Literature	55.00	
Travel expenses	1,377.00	
Section expenses	658.87	
Annual meeting (Philadelphia):		
Preliminary announcement	$ 555.84	
Program (printing)	2,085.00	

Report	874.27		
Popular lectures	305.10		
Exhibition	3,841.50		
General expenses:			
At Washington	1,421.99		
At Philadelphia	2,987.15	12,070.85	
Annual meeting (Nashville):			
Exhibition	$ 890.93		
General expenses (Washington office)	95.54	986.47	17,003.91
By expenses, Committee of One Hundred			551.18
Agassiz Bust fund:			
Total fund collected, paid to Hall of Fame	$ 1,310.00		
Expenses, circularizing members for Agassiz Bust fund	362.33		1,672.33
By expenditures Joint Committee on Promotion of Research in Colleges			269.84
By special subscriptions:			
SCIENCE and *Scientific Monthly*	2,499.00		
Science News-Letter	8,022.00		10,521.00
Total expenditures			95,097.65
By new balance:			
Checking account (American Security & Trust Co.)	21.14		
*Publication fund	2,000.00		
*Special fund for Committee on Place of Science in Education	882.89		
*Special fund for Joint Committee for Promotion of Research in Colleges	230.16		
*Emergency fund	5,000.00		
*Available for general purposes	3,394.88		11,529.07
			$106,626.72

(*Signed*) BURTON E. LIVINGSTON,
Permanent Secretary.

AUDITOR'S REPORT

As auditor for the association for the year 1926–27, I have employed Mr. W. R. Gallaher, an accountant at the Interstate Commerce Commission, to go over the accounts of the permanent secretary for the year ending September 30, 1927. He makes the following report:

> "This is to certify that I have examined the receipts and disbursements in currency, checks, etc., of the permanent secretary's office of the American Association for the Advancement of Science for the twelve months ending September 30, 1927, and have found the records correctly kept. Proper vouchers were shown for all disbursements.
>
> (*Signed*) W. R. GALLAHER,
> *Accountant.*"

I have reason to believe that Mr. Gallaher is an experienced and reliable accountant and that the above statement is a dependable report on the state of the accounts that were audited.

Very truly yours,
(*Signed*) ROBERT B. SOSMAN,
Auditor.

Washington, D. C.,
November 21, 1927.

* Funds designated by an asterisk are all in the Savings Department of the Federal-American National Bank, of Washington.

NOTES ON THE PERMANENT SECRETARY'S FINANCIAL REPORT

The permanent secretary adds the following notes on his financial report for the fiscal year 1926–27, which may be of interest.

The publication fund is a reserve for the publication of the Proceedings volume, containing the Summarized Proceedings and the Directory of Members, which appears every four years. The most recent volume was published in December, 1925, and the next one is to appear in the fall of 1929. It will include the accounts of the fifth New York meeting and will carry the membership record forward to about June, 1929. From the general income is set aside each year the sum of $1,000 for the publication fund, which amounted to $2,000 on September 30, 1927. The emergency fund is simply a reserve for emergencies; it is available for general purposes and is maintained at $5,000 in the absence of emergencies.

Receipts from annual-membership dues and entrance fees paid by new members amounted to $69,698.27 for the year 1926–27. Life-membership fees are all turned over to the treasurer at the end of each year and the treasurer pays annually to the permanent secretary's office a sum amounting to three dollars for each living sustaining or life member, which covers the cost of the regular journal subscriptions for these members. The amount thus received from the treasurer in 1926–27 was $1,245.00. This amount may be added to the income from annual dues and entrance fees, giving $70,943.27 as the total receipts on account of all memberships throughout the year in question.

It is interesting to observe, from the notes on the treasurer's report, that the income from the invested fees of living sustaining and life members for 1926–27 is shown as $143.22 + $1,317.58, or $1,460.60, which exceeds by $215.60 the cost ($1,245.00) of the journal subscriptions for these members. At the present time the income from the fees of living sustaining and life members is therefore a little more than sufficient to care for their journal subscriptions. Indeed, these subscriptions were this year more than cared for by the income ($1,317.38) from the fees of living life members alone.

Payments for the special journal subscriptions for the *Scientific Monthly* and the *Science News-Letter*

(at three dollars each) are all turned over to the respective publishers of the journals and the work of handling these is a definite contribution from the association toward the support of the journals and toward the popularization of science. About eight per cent. of the new members joining between October 1 and December 20, 1927, subscribed for one or the other of the extra journals and these are equally distributed between the two journals, four per cent. to each. For the same period 2,796 subscriptions were received from old members for one or the other of the extra journals, two thirds of these being for the *News-Letter* and one third for the *Monthly*.

The Agassiz Bust fund ($1,310) was raised by personal subscriptions from members of the biological and geological sections. The cost of circularization for this fund amounted to $362.33, which was not charged against the fund, consequently the association actually contributed this amount. The fund itself ($1,310) has been transmitted to the Hall of Fame, New York University, as a contribution from members of the American Association toward the cost of a bust of Louis Agassiz, which is to be unveiled in the Hall of Fame probably next May.

The accounts for the expenses of the Philadelphia meeting are not as complete as they should be, for no final report has been received from the local committee for that meeting, but they are presumably nearly correct as shown in the permanent secretary's report, where the total extra expense on account of that meeting appears as $8,229.35, omitting the cost of the exhibition. Aside from exhibition receipts, the income from the meeting was $1,303.00 from registration fees and $435.50 from advertising and sale of the program, or $1,738.50 in all, leaving a deficit for that meeting amounting to $8,229.35—$1,738.50, or $6,490.85. Of this deficit $4,027.25 is shown to have been covered by locally raised funds, and consequently the real deficit for the Philadelphia meeting was $2,463.60, paid from the current funds of the permanent secretary's office.

The annual exhibition at Philadelphia is shown by the report to have cost $3,841.50 and the gross income therefrom is shown to have been $4,091.50, with a net income of $250.00. An advance fund of $500 had been appropriated for initial expenses of the exhibition, of which only $250 had been expended, and this expenditure was offset by the net gain. Therefore the exhibition was really a source of neither gain nor loss.

For the year considered the association paid $42,-610.75 for membership journal subscriptions and $17,062.42 for the regular expenses of the Washington office and it contributed $3,086.75 toward the expenses of its divisions and local branch and of the affiliated academies of science. It is interesting to note that the amount contributed to divisions, branch and academies is a little larger than the appropriation ($3,000) for individual grants for research, derived from the treasurer's funds.

At the beginning of the year 1926–27 there was available for general purposes $2,025.68 in the permanent secretary's hands. At the end of the year this balance is shown as $3,416.02 ($21.14 in the checking account and $3,394.88 in the savings account), the gain being $1,390.34, or about 2 per cent. of the total income on account of all memberships for the year.

REPORT OF THE COMMITTEE ON THE PLACE OF SCIENCE IN EDUCATION

Following is the summary report of the Committee on the Place of Science in Education (Dr. Otis W. Caldwell, *chairman*), which was accepted by the council at its session on December 29. In connection with this summary report, the reader is referred to paragraphs 24 and 25 of the section on "Legislative and Executive Proceedings," in this issue of SCIENCE.

REPORT

The Committee on the Place of Science in Education has prepared a report for the council which it now submits. This report summarizes the work of the committee up to the present time. The committee has considered the whole subject of the relations and uses of science, of which science teaching in schools and colleges is but a part. Outlines and suggestions have been published as the work progressed, these resulting in much correspondence and in local conferences, and the conclusions are included in the report.

The committee also reports that a more complete statement of its work is nearly ready for publication, and requests authorization to proceed with publication when that statement is completed. The manuscript will consist of about fifty typed pages. It should be published in such a way as to secure wide circulation. It is expected that special funds will be secured by the committee to cover the cost of publication.

Three further needs have become recognized by the committee, through its conferences. To meet these needs the council is requested to approve the following recommendations:

(a) That some organization of national scope, such as the United States Bureau of Education, or the Research Division of the National Education Association, be asked by this committee to undertake a comprehensive and intensive study of the situations, tendencies and needs of science instruction in educational systems.

(b) That the services of a field secretary be secured, to work with existing agencies, to distribute information on research in science education, to stimulate further research, to operate as a sort of clearing-house agent and to continue the organizing of new groups of science teachers, writers for popularization of science, etc. This field secretary should work under the guidance of the Committee on the Place of Science in Education, or under the guidance of a national council of science teachers as soon as such a council is formed.

(c) That a national council of science teachers be organized to advance science teaching, to increase public appreciation of science and to secure for science teachers increased facilities and a wider usefulness. The services of a field secretary would be very useful in the organization of such a council.

(*Signed*) OTIS W. CALDWELL,
Chairman.

GRANTS FOR RESEARCH, FOR 1928

An appropriation of $3,000 was made by the council at Nashville for individual grants in aid of scientific research, to be allotted to applicants by the Committee on Grants for Research. Fifty-six applications were received and considered in the regular way by the committee. The sums requested amounted, on the whole, to $18,500. Since only $3,000 was available for this allotment, it follows that a very large number of applicants must be disappointed. This fact should not be allowed to discourage applications for future years, however, for the committee feels that better selections are possible when the number and amounts of the applications greatly exceed the possibilities for actual grants. Members who have research projects suitable for grants from the association should not hesitate to make application.

Applications are made on special blanks, obtainable from the Washington office of the association, and they may be sent in at any time. Allotments are made only at the time of the annual meeting. In recent years the amount of a single grant has not exceeded $500 and most of the grants are for smaller sums. This year the largest grant is for $350.

The chairman of the Committee on Grants for Research has reported the following allotments of funds for 1928, all of the council's appropriation for this purpose being thus used up. The list is arranged according to the several fields of science represented.

Physics

James W. Broxon, University of Colorado, Boulder, Colo. For studying pressure variation of the natural ionization in gases at high pressures $350

A. L. Hughes, Washington University, St. Louis, Mo. For studying ionization and photoelectric effects with polarized light 150

Astronomy

Heber D. Curtis, Allegheny Observatory, Pittsburgh, Pa. For completion of large special comparator for parallax and proper motion investigations on the extensive stock of plates which have been taken with the Thaw Photographic Refractor at Allegheny Observatory 300

Geology and Paleontology

Seismological Society of America (S. D. Townley, Treasurer, Stanford University, Calif.). For investigation of earthquakes occurring on the Pacific Coast of the United States 200

Ferdinand Canu, 18 Rue de Peintre Lebrun, Versailles, France. For studying the Bryozoan fauna of the Galapagos Islands 150

Zoology

Phineas W. Whiting, Bussey Institution, Boston, Mass. For genetic work with the parasitic wasp, Habrobracon, especially in relation to sex-determination and parthenogenesis 150

Winterton C. Curtis, University of Missouri, Columbia, Mo. For studying effects of irradiation upon regeneration 300

Henry H. Collins, 916 Adelaide St., Pittsburgh, Pa. For investigation of the effects of inter-specific gonad transplantation upon the development of specific characters in ontogeny and in regeneration, in certain urodele amphibia, together with incidental studies of life histories and geographic variations 200

Botany

William R. Maxon, U. S. National Museum, Washington, D. C. For preparation of manuscript for a volume describing the pteridophyta of Jamaica, to be published as one of the series now issuing from the British Museum (Natural History), "Flora of Jamaica," by Fawcett and Rendle 300

Joyce Hedrick, 106 E. Spring St., Oxford, Ohio. For continuing research of Dr. Bruce Fink on "The Lichen Flora of the United States" 200

Anthropology

Henry B. Collins, Jr., U. S. National Museum, Washington, D. C. For archeological research at ancient village sites in northern Alaska, particularly on St. Lawrence Island, for the purpose of tracing ancient migrations in the vicinity of Bering Strait 300

Physiology and Medicine

Elery R. Becker, Iowa State College, Ames, Iowa. For investigation of the physiological rôle in their host of the protozoa which inhabit the

rumen and reticulum of normal, healthy ruminants 300

Roy L. Moodie, 1021 11th St., Santa Monica, Calif. For the study of surgery in pre-Columbian Peru 100

GENERAL OFFICERS OF THE ASSOCIATION FOR 1928

The president and the vice-presidents for any year automatically become the retiring president and the retiring vice-presidents for the following year. Consequently this list shows the names of the president and vice-presidents for 1927 as well as for 1928. Dr. L. H. Bailey, of Ithaca, N. Y., was retiring president for 1927. The section secretaries are elected for a four-year term, expiring at the end of 1928, but the secretaries of Sections A, H, L and N found it necessary to resign at the Nashville meeting. For Sections A, H and N their successors were elected for a term of one year.

President

Henry Fairfield Osborn, American Museum of Natural History, New York, N. Y.

Retiring President

Arthur A. Noyes, California Institute of Technology, Pasadena, Calif.

Vice-Presidents, Retiring Vice-Presidents and Secretaries of the Sections

Section A (Mathematics):

Vice-president, Raymond C. Archibald, Brown University, Providence, R. I.

Retiring Vice-president, Dunham Jackson, University of Minnesota, Minneapolis, Minn.

Secretary, Charles N. Moore, University of Cincinnati, Cincinnati, Ohio. (To succeed Raymond C. Archibald, resigned.)

Section B (Physics):

Vice-president, P. W. Bridgman, Harvard University, Cambridge, Mass.

Retiring Vice-president, Arthur H. Compton, University of Chicago, Chicago, Ill.

Secretary, A. L. Hughes, Washington University, St. Louis, Mo.

Section C (Chemistry):

Vice-president, C. E. K. Mees, Eastman Kodak Co., Rochester, N. Y.

Retiring Vice-president, Roger Adams, University of Illinois, Urbana, Ill.

Secretary, Gerhard Dietrichson, Massachusetts Institute of Technology, Cambridge, Mass.

Section D (Astronomy):

Vice-president, J. S. Plaskett, Dominion Astrophysical Observatory, Victoria, B. C., Canada.

Retiring Vice-president, Walter S. Adams, Mt. Wilson Observatory, Pasadena, Calif.

Secretary, Philip Fox, Dearborn Observatory, Northwestern University, Evanston, Ill.

Section E (Geology and Geography):

Vice-president, Frank Leverett, University of Michigan, Ann Arbor, Mich.

Retiring Vice-president, Charles Schuchert, Yale University, New Haven, Conn.

Secretary, G. R. Mansfield, U. S. Geological Survey, Washington, D. C.

Section F (Zoological Science):

Vice-president, M. F. Guyer, University of Wisconsin, Madison, Wis.

Retiring Vice-president, C. E. McClung, University of Pennsylvania, Philadelphia, Pa.

Secretary, Geo. T. Hargitt, Syracuse University, Syracuse, N. Y.

Section G (Botanical Sciences):

Vice-president, C. E. Allen, University of Wisconsin, Madison, Wis.

Retiring Vice-president, William Crocker, Boyce Thompson Institute for Plant Research, Yonkers, N. Y.

Secretary, Sam F. Trelease, Columbia University, New York, N. Y.

Section H (Anthropology):

Vice-president, Fay-Cooper Cole, University of Chicago, Chicago, Ill.

Retiring Vice-president, R. J. Terry, Washington University, St. Louis, Mo.

Secretary, Charles H. Danforth, Stanford University, Calif. (To succeed Fay-Cooper Cole, resigned.)

Section I (Psychology):

Vice-president, Howard C. Warren, Princeton University, Princeton, N. J.

Retiring Vice-president, Knight Dunlap, Johns Hopkins University, Baltimore, Md.

Secretary, Frank N. Freeman, University of Chicago, Chicago, Ill.

Section K (Social and Economic Sciences):

This section is not organized at present.

Section L (Historical and Philological Sciences):

This section is not organized at present.

Section M (Engineering):

Vice-president, Robert Lemuel Sackett, Pennsylvania State College, State College, Pa.

Retiring Vice-president, A. N. Talbot, University of Illinois, Urbana, Ill.

Secretary, N. H. Heck, U. S. Coast and Geodetic Survey, Washington, D. C.

Section N (Medical Sciences):

Vice-president, A. J. Goldforb, College of the City of New York, New York, N. Y.

Retiring Vice-president, G. Canby Robinson, Vanderbilt University, Nashville, Tenn.

Secretary, James Harold Austin, University of Pennsylvania, Philadelphia, Pa. (To succeed A. J. Goldforb, resigned.)

Section O (Agriculture):

Vice-president, C. A. Mooers, University of Tennessee, Knoxville, Tenn.

Retiring Vice-president, L. E. Call, Kansas State Agricultural College, Manhattan, Kans.

Secretary, P. E. Brown, Iowa State College, Ames, Iowa.

Section Q (Education):

Vice-president, Truman L. Kelley, Stanford University, Calif.

Retiring Vice-president, Arthur I. Gates, Teachers College, Columbia University, New York, N. Y.

Secretary, A. S. Barr, University of Wisconsin, Madison, Wis.

Permanent Secretary

Burton E. Livingston, Johns Hopkins University, Baltimore, Md. (Association mail address: Smithsonian Institution Building, Washington, D. C.)

General Secretary

W. J. Humphreys, U. S. Weather Bureau, Washington, D. C.

Treasurer

John L. Wirt, Carnegie Institution of Washington, Washington, D. C.

Secretary of the Council and Program Editor

Sam L. Trelease, Columbia University, New York, N. Y.

Executive Assistant

Sam Woodley, Smithsonian Institution Building, Washington, D. C.

Auditor

R. B. Sosman, Geophysical Laboratory, Carnegie Institution of Washington, Washington, D. C.

News Manager

Austin H. Clark, U. S. National Museum, Washington, D. C.

Manager of Exhibition

H. S. Kimberly, Smithsonian Institution Building, Washington, D. C.

The Council

The council for 1928 consists of the newly-elected president, the general secretary, the permanent secretary, the treasurer, the vice-presidents, the section secretaries, all members of the executive committee not otherwise members of the council, the representatives of the affiliated organizations, and the eight elected council members named below.[1]

Austin H. Clark (1931), U. S. National Museum, Washington, D. C.

Arthur H. Compton (1931), University of Chicago, Chicago, Ill.

L. E. Dickson (1930), University of Chicago, Chicago, Ill.

David White (1930), U. S. Geological Survey, Washington, D. C.

John C. Merriam (1929), Carnegie Institution of Washington, Washington, D. C.

Rodney H. True (1929), University of Pennsylvania, Philadelphia, Pa.

L. O. Howard (1928), U. S. Department of Agriculture, Washington, D. C.

D. T. MacDougal (1928), Desert Laboratory, Tucson, Ariz.

(The first two names replace those of W. A. Oldfather and G. W. Stewart, whose terms expired at the end of 1927.)

The Executive Committee

The executive committee consists of the newly-elected president, the general secretary, the permanent secretary, and the eight elected members named below.[2]

David R. Curtiss (1931), Northwestern University, Evanston, Ill.

John Johnston (1931), U. S. Steel Corporation, New York, N. Y.

J. McKeen Cattell (1930) (*chairman*), Garrison-on-Hudson, N. Y.

Henry B. Ward (1930), University of Illinois, Urbana, Ill.

F. R. Moulton (1929), 327 S. La Salle St., Chicago, Ill.

M. I. Pupin (1929), Columbia University, New York, N. Y.

Vernon Kellogg (1928), National Research Council, Washington, D. C.

Edwin B. Wilson (1928), Harvard School of Public Health, Boston, Mass.

(The first two names replace those of H. L. Fairchild and W. A. Noyes, whose terms expired at the end of 1927.)

The Committee on Grants for Research[2]

Walter S. Adams (1931) (for Astronomy), Mt. Wilson Observatory, Pasadena, Calif.

Karl F. Kellerman (1931) (for Botany), Bureau of Plant Industry, Washington, D. C.

W. Lash Miller (1930) (for Chemistry), 8 Hawthorne Ave., Toronto, Ont., Canada.

Oswald Veblen (1930) (for Mathematics), Princeton University, Princeton, N. J.

L. G. Hoxton (1929) (for Physics), University of Virginia, University, Va.

Vernon Kellogg (1929) (for Zoology), National Research Council, Washington, D. C.

Joseph Erlanger (1928) (for Physiology), Washington University School of Medicine, St. Louis, Mo.

Nevin M. Fenneman (1928) (for Geology), University of Cincinnati, Cincinnati, Ohio.

(The first two names replace those of B. M. Davis and A. Hrdlička, whose terms expired at the end of 1927.)

FUTURE ANNUAL MEETINGS

The American Association meets annually in convocation week, the dates for the meetings being determined by a rule adopted by the council. When New Year's day falls on Thursday, Friday or Saturday the meeting period is the week (Monday to Saturday, inclusive) in which New Year's day occurs. When New Year's day falls on Sundays the meeting period is

[1] The number in parentheses denotes the year at the end of which the member's term of office is to expire.

[2] The number in parentheses denotes the year at the end of which the member's term of office is to expire.

the preceding week. And when New Year's day falls on Monday, Tuesday or Wednesday the meeting opens on December 27 and continues through January 2. Plans of individuals and societies may thus be made years in advance. It requires just twenty-eight years to complete the cycle of dates and days. Dates and meeting places for the next five annual meetings are shown below.

1928–29 (New York): Thursday, December 27, 1928, to Wednesday, January 2, 1929.

1929–30 (Des Moines): Friday, December 27, 1929, to Thursday, January 2, 1930.

1930–31 (probably Cleveland or Montreal): Monday, December 29, 1930, to Saturday, January 3, 1931.

1931–32 (probably New Orleans): Monday, December 28, 1931, to Saturday, January 2, 1932.

1932–33 (Chicago): Monday, December 26, to Saturday, December 31, 1932.

SPECIAL NOTES

(1) This issue of SCIENCE contains only the general reports on the second Nashville meeting. Reports of the sessions of sections and societies are to appear in the next following issue, for February 3.

(2) The journal subscriptions of members for 1927 who have not yet enrolled for 1928 are to be continued to include the issue of SCIENCE for February 3. Dues for 1928 that have not been paid earlier should be paid now; otherwise the journal subscriptions can not be continued longer.

(3) All who are interested in the advancement of science and education should belong to the American Association. New members are received at any time. Information about the organization and work of the association and about the responsibilities and privileges of membership therein may be secured at any time from the permanent secretary who is to be addressed at the Washington office of the American Association for the Advancement of Science, Smithsonian Institution Building, Washington, D. C.

SCIENTIFIC EVENTS

NEW BUILDING FOR THE PHYSICAL SCIENCES AT THE UNIVERSITY OF CHICAGO

ANNOUNCEMENT of a new building for physics, mathematics and astronomy was made on January 12 by President Max Mason, of the University of Chicago, at the annual dinner of the trustees to the faculty.

A gift from Mr. Bernard A. Eckhart, president of the B. A. Eckhart Milling Co., has been added to a fund already available and has made it possible for the university to proceed with a building on a scale adequate to the needs of these three important departments rather than a building of limited possibilities. "In recognition of Mr. Eckhart's benefaction, the building will be known as the 'Bernard A. Eckhart laboratory.'"

The laboratory will be erected to the east of Ryerson physical laboratory. Charles Z. Klander, well-known Philadelphia architect, is now engaged in drafting plans for the laboratory, and has already submitted sketches for a structure of Gothic design in harmony with the university's style of architecture.

Ryerson physical laboratory, given the University of Chicago thirty-four years ago by Martin A. Ryerson in honor of his father, is now inadequate to the needs of the three departments, which have been among the most productive in the university. Most of the activities of the astronomy department, however, are centered in the university's Yerkes Observatory at Williams Bay, Wis.

A correspondent writes: "The physics department at Chicago is distinguished, the only three awards of the Nobel prize in physics to America having been made to University of Chicago men, Albert A. Michelson, Arthur H. Compton and Robert Millikan, now head of the Norman Bridge Laboratory of Pasadena, California. In the mathematics department, Professors E. H. Moore, Gilbert A. Bliss, Herbert E. Slaught and Leonard E. Dickson are among the leading mathematicians of the country."

THE PURE SCIENCE RESEARCH FUND AT PRINCETON UNIVERSITY

PRESIDENT JOHN GRIER HIBBEN has announced that, in consideration of the fact that Princeton University has already received in cash more than a million dollars toward its three-million dollar pure-science research fund, the General Education Board has granted the university for the coming year the interest on half its conditional gift of one million dollars.

The gift of the General Education Board of one million dollars was contingent on the university raising the other two million dollars from other sources. The grant for the coming year amounts to $25,000, representing five per cent. interest on half of the conditional gift. $1,461,000 has already been pledged toward the $2,000,000 which Princeton University must raise, of which $1,133,945 has been paid.

President Hibben has made the following statement regarding the fund:

> The funds already received for pure science research have enabled the trustees to appoint five research pro-

fessors who, with the cooperation of other professors in their departments, graduate students and National Research Fellows and International Research Fellows, are carrying on research in science to a degree unprecedented in Princeton.

In the mathematics department a group of research students comprising six National Research Fellows and two International Research Fellows—one a privat-docent at Berlin and the other a professor from Russia—are engaged in research in analysis situs and differential geometry, the chief fields of research of our mathematicians.

In the chemistry department the number of men engaged in research is 30 per cent. greater than last year. A considerable number of the investigators in chemistry are engaged in catalytic studies. They include a research associate from Sweden, an International Research Fellow from Berlin, one National Research Fellow, a visiting professor on leave from India, a visiting fellow from Oxford and several graduate students.

Investigators in the department of physics are cooperating with those in the department of chemistry in a combined attack on problems of excited atoms, dielectrics and the electrical properties of molecules. Important spectroscopic work is also being done in collaboration with the department of astronomy. Twenty-four men are conducting experiments in physics, including nine members of the regular staff, nine graduate students, three National Research Fellows, one International Research Fellow from Göttingen, one Procter Fellow from Cambridge University, England, and one fellow each from the research laboratories of the General Electric Company and the Westinghouse Company.

In the department of biology, researches on heredity and mutation in plants, on the localization of developmental materials and processes in animal eggs, on the origin of the vascular system in vertebrates, on the morphology and physiology of bioluminescence and the biochemistry of photosynthesis are being conducted by twelve members of the staff and graduate students.

RESOLUTION REGARDING THE U. S. COAST AND GEODETIC SURVEY

THE following resolution, prepared with the authority of the council of the Geological Society of America, was adopted by the society assembled in annual meeting at Cleveland, on December 30, 1927.

WHEREAS, Housebill No. 7480 to transfer the geodetic, seismologic and related services of the U. S. Coast and Geodetic Survey to the U. S. Geological Survey is before the committee on interstate and foreign commerce of the house and has been presented in the senate, and

WHEREAS, The proposed transfer, if effected, would materially change the status of the specified scientific research which is of great importance to science and to the people of the United States, and

WHEREAS, The proposed administrative change would disrupt the Coast and Geodetic Survey and would terminate the activity of that organization in lines of research in which it has long been engaged and in which it has won the respect and confidence of the scientific world among all nations;

Therefore, be it resolved, That it is the sense of this society that the proposed transfer should be made only after thorough consideration by competent scientific authority and in accordance with the recommendations which that authority may make; and

That to this end we recommend that the proposed legislation be referred to the National Academy of Sciences for appropriate action, and further that copies of this resolution shall be forwarded to the committees of the House and Senate having charge of the respective bills.

BAILEY WILLIS,
EDWARD B. MATHEWS,
Committee

THE SECOND SESSION OF THE INSTITUTE OF CHEMISTRY

THE second session of the Institute of Chemistry of the American Chemical Society will be held in Evanston, Illinois, from July 23 to August 18. Every effort is being made to arrange the lectures and conferences of the institute in such a way as to offer a unique service to chemists both industrial and academic. The committee in charge of the institute consists of N. E. Gordon, chairman of the A. C. S. committee on chemical education, University of Maryland; B. S. Hopkins, chairman of the division of chemical education, A. C. S., University of Illinois; H. E. Howe, editor, *Industrial and Engineering Chemistry* and head of the A. C. S. news service, Washington, D. C.; C. E. K. Mees, Eastman Kodak Company; S. W. Parr, president of the American Chemical Society, University of Illinois; C. L. Parsons, secretary of the American Chemical Society, Washington, D. C.; C. M. A. Stine, E. I. du Pont de Nemours and Company; G. L. Wendt, Pennsylvania State College; F. C. Whitmore, National Research Council; W. R. Whitney, General Electric Company, and F. W. Willard, Western Electric Company. The executive secretary will be C. D. Hurd, Northwestern University, Evanston, Illinois.

Following is a tentative list of subjects for conferences for the Institute of Chemistry. Suggestions and criticisms should be sent to F. C. Whitmore, National Research Council, Washington, D. C. There will be 28 conferences, arranged at times when two and a half hours will be available for each. Thus, several conferences will be devoted to the same subject if it seems important enough to warrant this.

One group of subjects will deal with the help which chemistry can give for the better utilization of raw materials:

Agricultural products
Coal

Petroleum
Metals
Animal products

Only certain aspects of these subjects can be covered. In addition, certain miscellaneous subjects have been suggested for conferences:

Chemotherapy
Disposal of municipal wastes
Rubber
Science and national defense
Chemistry life processes
Synthetic "raw" materials
Antioxidants
Cellulose

Suggestions are needed regarding the special phases of these topics which can best be treated and regarding the best men to lead the discussions. Conferences will not be limited to the subjects listed above.

SCIENTIFIC NOTES AND NEWS

DR. HUGH S. TAYLOR, David D. Jones professor of research chemistry at Princeton University, has been awarded the Nichols medal by the New York section of the American Chemical Society. Presentation of the medal will be made at a meeting of the section on March 9, when Dr. Taylor will speak on "Catalysis as an Inspiration of Fundamental Research."

DR. LOUIS B. WILSON, director of the Mayo Foundation, has been elected an honorary member of the Royal Society of Medicine at Rome.

DR. JOSEPH EASTMAN SHEEHAN, of New York, was decorated with the Order of Alphonso XII by the personal physician of the king of Spain, January 3, in recognition of his work in plastic surgery.

AT the Christmas meeting of the American Psychological Association in Columbus, Ohio, a dinner was given by twenty-five psychologists for Professor Margaret F. Washburn, of Vassar College. Professors Bentley, of Illinois; Langfeld, of Princeton; Yerkes, of Yale; Pillsbury, of Michigan, and Mull, of Sweetbriar, spoke and Professor Warren, of Princeton, presented to Miss Washburn a volume of studies in her honor. The dedication of the volume reads as follows: "To Margaret Floy Washburn, teacher, editor, author, scientist, twenty-five years professor of psychology at Vassar College, the editor of *The American Journal of Psychology*, on completing thirty-three years of distinguished service to psychology, this volume is dedicated by her colleagues."

THE following officers for 1928 have been elected by the Washington Academy of Sciences: *President*, Robert B. Sosman, Geophysical Laboratory; *Non-Resident Vice-presidents*, B. W. Evermann, Museum of the Academy of Sciences, San Francisco, Calif., J. G. Lipman, Agricultural Experiment Station, New Brunswick, N. J.; *Corresponding Secretary*, L. B. Tuckerman, Bureau of Standards; *Recording Secretary*, W. D. Lambert, Coast and Geodetic Survey; *Treasurer*, R. L. Faris, Coast and Geodetic Survey.

AT the annual meeting of the Mineralogical Society of America held at the Case School of Applied Science from December 29 to 31, the following officers were elected: *President*, Esper S. Larsen, Harvard University; *Vice-president*, Lazard Cahn, Colorado Springs, Colorado; *Secretary*, Frank R. Van Horn, Case School of Applied Science; *Treasurer*, Alexander H. Phillips, Princeton University; *Editor*, Walter F. Hunt, University of Michigan; *Councillor 1928–1931*, Ellis Thomson, University of Toronto.

DR. DOUGLAS W. JOHNSON, professor of physiography at Columbia University, has been elected president of the Association of American Geographers.

DR. CARL L. MCDONALD has been elected president of the Academy of Medicine of Cleveland for the ensuing year.

DR. EMERY R. HAYHURST, professor of hygiene in the Ohio State University College of Medicine, Columbus, has been made chairman of the national committee of the United States for the Fifth International Medical Congress for Industrial Accidents and Occupational Diseases to be held in Budapest in September, 1928.

ON December 31, when the resignation of Dr. C. W. Larson as chief of the Bureau of Dairy Industry became effective, Secretary Jardine designated Dr. L. A. Rogers, senior bacteriologist of the bureau, as acting chief of the bureau, effective January 1, to serve until further notice. Dr. Rogers is in charge of the dairy research laboratories of the bureau.

S. B. HASKELL, director of the Massachusetts Experiment Station, resigned on December 15 to take a position with the agricultural department of a synthetic nitrogen products corporation.

CHARLES MERVYN SLAGG, chief of the tobacco division for the Department of Agriculture, Dominion of Canada, with headquarters at Ottawa, has resigned his commission to become director of tobacco investigations for the commonwealth of Australia. After visiting tobacco investigation stations in Massachusetts, Connecticut, Virginia and Wisconsin, he will sail from the Pacific coast to Melbourne, where his headquarters will be stationed.

DR. WILLIAM CROCKER, director of the Boyce

Thompson Institute for Plant Research at Yonkers, New York, will take up his four months' residence in Washington, D. C., beginning February 1, to complete his service as chairman of the division of agriculture and biology of the National Research Council. Dr. Crocker will be available for consultation at the institute on the 1st and 15th of each month during this absence.

DR. JOHN K. SMALL, head curator of the museums and herbarium of the New York Botanical Garden, has been granted leave of absence for a period of several weeks so that he may cooperate with Thomas A. Edison in his rubber investigations. Dr. Small left for southern Florida on January 17.

DR. HOWARD A. KELLY, professor emeritus at the Johns Hopkins University, Baltimore, delivered the Hunterian oration before the Hunterian Society in London on January 16. This is the second successive time the honor has fallen to an American physician, the last Hunterian address having been delivered by Dr. John M. T. Finney, of Baltimore.

DR. C. W. KANOLT, research physicist of the U. S. Bureau of Mines, gave an address on January 17 before the University of Pittsburgh chapter of the Sigma Xi on "The Production of Extremely Low Temperatures."

ON January 7, Dr. H. F. Moore, research professor of engineering materials, University of Illinois, delivered an address to the Royal Canadian Institute, on the subject "Fatigue of Metals."

JOHN B. TAYLOR, consulting engineer of the General Electric Co., will address the Franklin Institute on February 2, on "Making Sound Visible and Light Audible."

THE seventh series of Beaumont lectures which are under the auspices of the Wayne County Medical Society, Detroit, was given by Dr. George Draper, assistant professor of clinical medicine, Columbia University College of Physicians and Surgeons, on January 23 and 24, on (1) "Human Constitution; What It means and How to study It"; (2) "The Patient and His Physician," and (3) "The Sex Factor in Total Personality."

E. C. ANDREWS, state geologist of New South Wales, gave a public lecture on January 6 at the University of Cincinnati on "Broken Hill, a Romance of Australian Mining." The lecture was under the auspices of the Bag and Hammer Student Geological Society. Dr. Andrews also addressed the faculty and students of the department of geology on "Problems of Australian Geology."

DR. CORNEILLE HEYMANS, professor of pharmacology of the faculty of medicine of the University of Ghent, spoke on "Contributions to the Physiology and Pharmacology of the Cardio-Inhibitory and Respiratory Centers," at Stanford University on December 7.

MAJOR-GENERAL GEORGE WASHINGTON GOETHALS, the distinguished engineer, died on January 21, aged seventy years.

DR. JAMES CAMPBELL TODD, professor of pathology at the University of Colorado school of medicine since 1911, died on January 6, aged fifty-four years.

DR. JULIUS GRINKER, professor of nervous and mental diseases at the medical school of Northwestern University, died on January 11, aged sixty years.

JOSEPH FRANCIS O'BYRNE, professor of descriptive geometry at the Colorado School of Mines, died on December 22.

DR. WILLARD PARKER WARD, of Savannah, Georgia, known for his work on the metallurgy of manganese, died on January 17, aged eighty-two years.

The British Medical Journal states that the late Mr. W. Thelwall Thomas, of Liverpool, who died last September, has bequeathed £5,000 each to the University of Liverpool, to endow a fellowship in surgical pathology; the Royal College of Surgeons of England, and the Royal Medical Benevolent Fund for pensions for medical men and their widows. He has also given £1,000 to the Liverpool Medical Institution for the annual purchase of books of reference or journals. He directed that his house in Rodney Street should be used as chambers for medical men so long as the executors shall think fit; the portrait in oils of himself he bequeathed to the University of Liverpool.

PRESIDENT W. W. CAMPBELL, of the University of California, announced on December 12 that among other scholarships available, a Sheffield Sanborn scholarship of $325 for a student in the school of medicine; also gifts of $450 for a study of the relation of the intestinal flora to disease; of $100 by Dr. Curle Latimer Callander in support of the Callander surgical and topographic anatomy fund; of $200 for the use of the Hooper Foundation, and of $100 by Dr. Theodore C. Lawson, Oakland, as partial repayment of a scholarship awarded him in 1919.

THE French correspondent of the *Journal* of the American Medical Association writes that the mayor of Lyons has been informed that the Rockefeller Foundation will guarantee to the University of Lyons, for the purchase of sites and for the construction of buildings to be used by the faculté de médecine et de pharmacie, the sum of 41,206,000 francs ($1,648,240), on condition that the sum of 15,000,000 francs is supplied from other sources or furnished by the govern-

ent of France. Accordingly, the president of the binet, in agreement with the minister of public in-ruction, has allotted 12,000,000 francs, payable in ree annual sums. There remains only 3,000,000 ancs to be guaranteed. Furthermore, 100,000,000 ancs is required to complete the Grange-Blanche ospital. That is the part that is to be undertaken the city of Lyons. The new buildings of the fac-lté de médecine are to be erected in the vicinity of e Grange-Blanche Hospital, so that there may be n intimate association with the hospital clinics.

THE first allotment under the Rollin D. Salisbury emorial research fund of the University of Chicago as been made to Professor J Harlen Bretz, of the epartment of geology, for the continuance of his tudies of the "scablands" of Washington formed by he scouring action of floods flowing from the glaciers t the close of the last glacial period.

ACCORDING to the *Journal* of the American Medical Association a conference on pellagra called by the overnor of Arkansas on December 6 was attended by bout 400 persons; in opening the meeting, the gov-rnor reviewed the work that had been done since the Mississippi flood last spring by Arkansas physicians nd those from other states who came to help, and rged full cooperation between all forces of the state or the control and prevention of pellagra. Dr. Joseph Goldberger, U. S. Public Health Service, Washington, D. C., who addressed the conference, stated that the records for 1927 indicate a considerable increase in the deaths of persons from pellagra in Arkansas. The number for the last year, it is said, will total between 600 and 700.

THE Federal Radio Commission has authorized the General Electric Company, Schenectady, N. Y., to erect an experimental station in Oakland, Calif., with 10,000 watts power and wave-length of 10 to 40 meters, for "the development of improved methods of fac-simile transmission and television." Construction will start immediately. It is expected the station will be completed by March 1. The visual images will be transmitted by wireless, using at first both continuous and interrupted waves.

THE Geological Survey of Denmark will celebrate its fortieth anniversary in June next year by a series of excursions and meetings to which foreign geologists are to be invited. Before the meeting to be held in Copenhagen, two simultaneous four-day excursions will be arranged (June 21–24): to Bornholm, which forms part of the Baltic Shield and is of great petrological, stratigraphical and tectonic interest; or, alternatively, to Moën and South Sjælland, where remarkable dislocations in the Senonian white chalk can be compared with the undisturbed formations. The meeting itself (June 25–28) will be devoted to lectures and discussions on the general geology of Denmark and to visits to the celebrated museums of Copenhagen. After the meeting an eleven-day excursion (June 29–July 9) will enable visiting geologists to study a wide range of glacial phenomena in north-west Sjælland, Fyn, Langeland and Jylland. Further particulars relating to the detailed program, accommodations and charges will be provided in a later circular.

THE Paris correspondent of the London *Times* writes that the French government has decided to undertake an official investigation of the agriculture of the country. During the latter half of the last century reports were compiled by the Ministry of Agriculture every ten years, in which information in regard to the nature and size of agricultural properties, the distribution of crops in different parts of France, the methods of cultivation, the use of fertilizers, etc., were set out in statistical form. The last of these reports was issued in 1892. Since then no detailed and comprehensive survey of French agriculture has been taken. The only official statistics issued relate to the yield of crops and numbers of sheep, cattle and horses and these are admittedly based on insufficient data. A minor consideration in deciding the government to make the survey without delay is that the International Agricultural Institute, which has its seat in Rome, and of which France is a member, has asked for information with a view to compiling a report on agriculture throughout the whole world. This information the French government would be unable to supply unless the survey were made.

UNIVERSITY AND EDUCATIONAL NOTES

BY the will of the late Dr. Morris Herzstein, one of the prominent physicians of San Francisco, Stanford University is to receive $100,000 for a chair of biology.

ON February 23 the new building of the Philadelphia College of Pharmacy and Science will be dedicated. The formal dedicatory exercises will be presided over by Dr. Wilmer Krusen, who was recently installed as president of the college.

IT is reported that Dr. Gregorio Amo, of California, will give shares of his oil holding to the amount of about $1,700,000 for the establishment of a fund to permit foreign students to study at the Central University of Spain. Dr. Amo also presented King Alfonso with $400,000 to be used in the creation of a university city.

TRUSTEES of Western Reserve University have voted

to offer the chair of medicine, left vacant by the death of Dr. Charles F. Hoover, to Dr. Cyrus Cressy Sturgis, now professor of medicine in the University of Michigan and director of its research hospital.

JOHN WILSON, assistant chief geologist for the Pan-American Oil Company, has been appointed assistant professor of geophysics at the Colorado School of Mines.

AT the Harvard Medical School, Dr. William E. Ladd has been appointed assistant professor of surgery, Dr. Robert M. Green, assistant professor of applied anatomy, and Dr. Edward P. Richardson, John Homans professor of surgery.

DR. MILO HELLMAN, research associate in physical anthropology at the American Museum of Natural History, has been appointed professor of comparative dental morphology at the New York University College of Dentistry.

DISCUSSION AND CORRESPONDENCE

OVARIAN SECRETION AND TUMOR INCIDENCE

IN an article under this title which appeared in SCIENCE for December 16, 1927, Dr. William S. Murray reports on experiments in which he analyzed the effect of ovarian hormones on the incidence of mammary cancer in mice. In this connection he refers to the historical development of this problem as follows: "It has been known for some time that the internal secretions of the ovaries play an important part in the physiological condition of females during and after the gestation period. That the influence of these hormones has also a direct effect upon the ability of mice to combat the growth of neoplasms has been demonstrated by Dr. L. O. Strong (1922) in his work upon transplanted tumors. Dr. Leo Loeb has "also" (quotation marks added by the writer) published a brief note on the effects of castration and enforced non-breeding on tumor incidence. More recently (1927) Dr. Carl F. Cori has published a very interesting paper on the results of castration and ovarian transplantation in mice."

This statement tends to create an erroneous impression as to the development of our knowledge of this problem. Instead of having "also published a brief note," I have published in addition to this brief note two extensive papers containing detailed data on this question. The first of these appeared as the first article in Volume I of the *American Journal of Cancer Research*, January, 1916, p. 1. The second appeared in the *Journal of Medical Research*, September, 1919, p. 477. In these papers I gave the first experimental proof that internal secretions may play an important rôle in the origin of tumors. I showed that there is a definite quantitative relationship between the time during which the ovarian hormones have had a chance to act on the mammary gland and the incidence of mammary cancer. This I proved through castration carried on in mice at different ages. I also showed that prevention of breeding lowers the incidence of cancer but not to the same degree as castration at an early period of sexual maturity. I furthermore attempted to produce mammary cancer in male mice through transplantation of ovaries without succeeding in this attempt. Dr. Cori also was unsuccessful in similar experiments, while Dr. Murray succeeded in obtaining a positive result in 4 out of 210 operated male mice, therefore in less than 2 per cent. of his animals.

Since my first complete article on this problem appeared, I have repeatedly in various papers discussed the theoretical importance of this question in the etiology of cancer. I may also add that it was only possible for the writer to undertake the study of this problem, because I had for many years previously studied the rôle of heredity in the etiology of cancer in investigations based on the conviction that heredity in cancer can only be satisfactorily analyzed, if different families of mice are bred separately under identical environmental conditions. Accordingly in cooperation with Miss A. E. C. Lathrop, I was able to obtain strains of mice with definitely known inherited cancer incidence which differed in the case of different strains. Thus we could prove the quantitative interaction between hereditary factors and factors founded on the inner environment of organisms. Furthermore I had occasion to point out that there are indications that a similar quantitative interaction exists also between hereditary factors and outer environmental factors. The question as to the effect of various glands with inner secretion on the growth of transplanted tumors is a problem of an entirely different character and experiments of this kind can throw no light on the rôle of hormones in the origin of cancer.

LEO LOEB

DEPARTMENT OF PATHOLOGY,
WASHINGTON UNIVERSITY
SCHOOL OF MEDICINE

LAWS RELATING TO MATHEMATICAL OPERATIONS

ONE of the most fundamental differences between the mathematics which preceded the nineteenth century and the mathematics of to-day is the fact that we now lay much more stress on certain laws which govern many of our mathematical operations. Among these are those now known even by the student of

elementary algebra as the commutative law and the distributive law. While attention was called to these laws in what is commonly regarded as the most influential mathematical text-book ever written, *viz.*, the "Elements of Euclid," very little stress was laid on them before the nineteenth century. As evidence of this fact we may note that modern mathematical historians have as yet furnished no instance where a special name was given to either of these laws before 1814 when a French writer, F. J. Servois, gave them their present names.

Another fundamental law which is now commonly explained in our text-books on elementary algebra is the associate law. It is well known that this law plays a prominent rôle in the modern subject known as the theory of abstract groups and that no one has as yet given an instance where a special name was assigned to it before W. R. Hamilton introduced its present name, about thirty years after F. J. Servois had introduced the names of the two laws noted above. It is known that A. M. Legendre directed attention to this law in 1798 and proved its validity as regards the multiplication of positive integers, but no one seems to have thus far noted any instance of its earlier explicit use. Its implicit use is very old since it is involved in the rule that the volume of a rectangular parallelopiped is equal to the product of three concurrent edges.

The history of these fundamental laws relating to the entire domain of mathematics, from the most elementary subjects to the most advanced, exhibits the slowness with which mathematical concepts sometimes gained their present positions in the literature. In particular, the attitude of mind which accords to the theory of groups a somewhat prominent position in the mathematics of to-day can perhaps be best explained by noting the growing stress placed on the laws which underlie very ancient mathematical operations. At any rate such profound changes relating to scientific questions should be of general interest even if it can not be foreseen whether they will be permanent. It is also possible that wide publicity relating to the present stage of our knowledge along these lines may lead to additions thereto.

G. A. MILLER

UNIVERSITY OF ILLINOIS

SOIL SCIENCE PUBLICATION IN RUSSIA

DR. A. YARILOV, editor of the Russian journals on soil science, "Bulletin Pochvoveda" and "Pochvovedenie" (Moscow, U. S. S. R., Vozdvizhenka 5, Gosplan) writes that beginning with the year 1928 the journals will publish papers in the original languages as submitted. He invites American colleagues to make use of these journals and in that way establish closer contact between soil science workers of the United States and Russia.

J. S. JOFFE

N. J. EXPERIMENT STATION.
NEW BRUNSWICK, N. J.

SCIENTIFIC BOOKS

The Elements of General Zoology. A Guide to the Study of Animal Biology, correlating Function and Structure with notes on practical exercises. By WILLIAM J. DAKIN, D.Sc., F. Z. S., professor of Zoology in the University of Liverpool. Oxford University Press, London: Humphrey Milford, 1927.

METHODS of teaching zoology are as numerous as the teachers but they group themselves naturally in three classes, those stressing structure, those emphasizing function and those magnifying habits and life histories. Professor Dakin's method is obviously the second as shown by his sub-title, and hence the morphologist, as well as the natural historian, has to make a very conscious effort to form a fair opinion of the real merits of the book. Were it entitled, "The Elements of Animal Physiology," its contents and purpose would be much better indicated. It is somewhat irritating to find animal physiology arrogating to itself the title of zoology. No one wishes to deny the vast importance of function, not merely as the concomitant but even as the "explanation" (in large part at any rate) of structure, but it is after all only a portion of the field of zoology. Some physiologists are poor zoologists because of a deficient knowledge of morphology, a complete ignorance of taxonomy, and a total indifference to habits and life histories. The real zoologist is the man who is interested in animals as living organisms whose structures, relationships, and natural history are vitally important—not the man who looks on them solely as machines.

Aside from this objection to Professor Dakin's title, the main criticism of his book has to do with omissions. Naturally any attempt to deal with the whole animal kingdom in one volume, even if only function is considered, necessitates omissions both numerous and important. The success of the writer must be judged in part by what he excludes, as well as by what he includes. Some of the omissions from the present volume are, to say the least, surprising. The most considerable perhaps is the complete omission of echinoderms—the phylum is mentioned on page 5 as one of "the most important phyla" in the animal kingdom (ten are given) but no further reference is made to it. The striking features of the skeleton, the unique method of excretion, the equally

unique means of adhesion and locomotion and the surprising metamorphosis from extraordinary larval forms are all alike ignored. Another striking case is that of the cephalopods, whose unusual modes of locomotion, remarkable means of concealment when in retreat, and highly developed eyes, surely demand at least a reference. On page 298, the statement occurs: "The most complicated eye in the Mollusca is found in the scallop"—one wonders just what is meant by "complicated" and why the cephalopod eye is overlooked. Omission of many other extraordinary structures, functions and activities among invertebrates might be cited but lack of space forbids. Among the vertebrates we find no reference to the shell and skeleton of turtles, only a trivial allusion to the locomotion of snakes, no reference to the nest-building and egg-laying of birds, and no reference to animal voices, not even the singing of birds. It would of course, be foolish, and unfair to Professor Dakin, to extend indefinitely this list of omissions, but the point the reviewer wishes to emphasize is that too much is overlooked or ignored to justify calling this book "The Elements of General Zoology."

That there is much of value in the volume is beyond question. The text is clear, the illustrations and diagrams good and the marginal subtitles are helpful. There is a brief introduction of 8 pages, followed by Section I "An Introduction to the Protozoa." The 25 pages thus used form one of the most satisfactory chapters in the book. Just enough of classification is introduced to hold together the facts and the student who really masters this account will have a coherent idea of the Protozoa. Section II, "The Study of the Biology of the Multicellular Animals" occupies over 400 pages and suffers from the attempt to omit everything in the nature of a classification. It is not necessary to enumerate here all the chapters or to discuss their contents. The general arrangement is that of the usual text-book on physiology—nutrition, respiration, blood and its circulation, locomotion, nervous system and sense organs, excretion and reproduction. A chapter on the animal skeleton precedes that on locomotion, while another on the cell is intercalated between locomotion and the nervous system—just why at this point it is hard to see. Chapters on life histories, on the fresh-water pond as an animal community, on symbiosis, parasites, disease and bacteria and on the animal as a whole, make up the remainder of this section. A dozen of the chapters end in suggestions for "Practical Work," experimental studies and observations by the students themselves. The discussion of the animal as a whole leads to a brief account of some of the aspects of heredity and evolution, and the relation of biology as a study, to human life. The book ends with 35 pages of general instructions for laboratory work, a brief appendix, and a not very satisfactory index of four pages. The student who really masters the contents of Section II will have an admirable idea of animal physiology, but his ideas of structure will undoubtedly be more or less confused and he will know almost nothing of the animal kingdom.

HUBERT LYMAN CLARK
MUSEUM OF COMPARATIVE ZOOLOGY,
CAMBRIDGE, MASS.

SCIENTIFIC APPARATUS AND LABORATORY METHODS

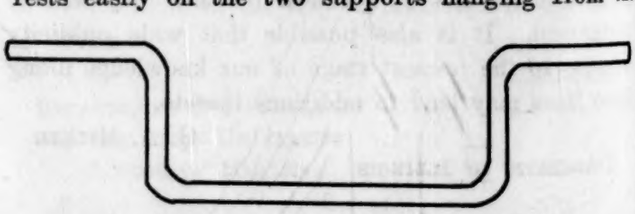
A CONVENIENT DEVICE FOR PLANT SOLUTION-CULTURE WORK

THE paraffin-impregnated corks commonly used as supports for the seedlings in plant solution-culture investigation present certain disadvantages which I have attempted to eliminate by substituting perforated paraffin discs supported on glass rods of appropriate design.

Two hundred cc. of hot water are measured into a 250 cc. Pyrex beaker which is placed on a hot-plate. To this is added ten grams of paraffin m.p. 52–56° C. When the latter is melted the beaker is removed from the hot-plate. When the paraffin disc has solidified by cooling, it is loosened with a thin-bladed knife and removed from the beaker. The diameter is lessened by paring off a millimeter or two from the circumference so that the disc fits loosely within the beaker in which the cultures are to be made.

The glass supports are made from 4 mm. rod. This is cut into 15 cm. lengths and marked off accurately at 2.5, 5.0, 10.0, and 12.5 cm. with a blue pencil. Right-angle bends are carefully made at these points using an iron block 2.5 cm. high as mold, and the small but hot flame of the micro-burner for heating. The complete support has this shape.

Four notches are cut in the paraffin disc so that it rests easily on the two supports hanging from the



edge within the beaker. When the discs and supports are properly made the former present a plane surface parallel with the surface of the culture solution which can be of any desired distance from the disc. Then the convenient number of holes is made in the paraffin disc through which the roots come in contact with the culture solution. These holes are made of any desired diameter by means of appro-

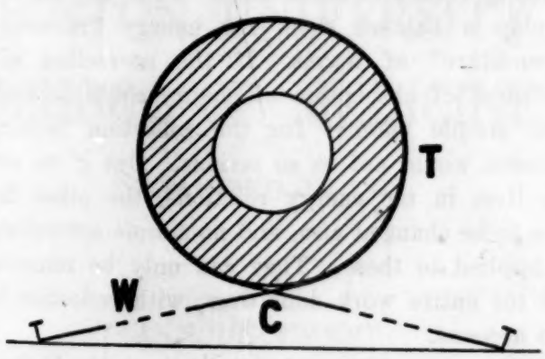
priately selected cork-borers. In order to prevent cracking of the disc it is necessary that the cork-borer be hot. I have found that immersion of the instrument in hot water does this best. So heated, a little well-like curbing is formed around the hole which serves nicely to keep the seedling raised from the flat upper surface of the disc.

It will be at once evident that this device is capable of any modification necessary to suit the individual need. It also allows of easy adjustment of depth of culture solution and degree to which the roots are immersed therein. Its convenience will be apparent to those who have wrestled as I have with the unplastic cork.

FREDERICK S. HAMMETT
RESEARCH INSTITUTION OF THE
LANKENAU HOSPITAL,
PHILADELPHIA, PA.

A METHOD FOR CUTTING GLASS TUBING

THE accompanying figure illustrates a method which has been found to be successful for cutting heavy glass tubing. A piece of bare, soft-drawn copper wire "W" is wrapped once around the tube "T" and fastened to the work bench. A mixture of carborundum powder and glycerine makes a convenient grinding compound. A to and fro motion of the glass in a direction parallel to the plane of the figure produces relative motion between the wire and glass and the carborundum is thus carried around. The glass should occasionally be turned so as to make a cut of uniform depth. In case it is



necessary to locate the cut exactly some kind of clamp or guide should be used until a groove is started. If a deep cut is made the point "C" where the wire crosses causes binding. When this stage is reached it is well to mount the tube in a lathe and hold the wire in the groove using only one half of a turn. (Be sure to protect the lathe from the compound.) New wire should replace the old frequently to avoid binding when the new is used.

The author's first use of the method was in cutting a Pyrex tube having an outside diameter of 4.4 centimeters and 1.2 centimeter walls. Number 80 carborundum powder was used, first with Number 18 wire and then with Number 20. The cutting time was about three hours. Finer wire and powder would be better for smaller or more delicate pieces.

The method has the advantages of simplicity, small breakage risk and freedom from strains introduced by methods using heat. It is particularly useful in cutting short lengths of tubing.

HERMAN E. SEEMANN
DEPARTMENT OF PHYSICS,
CORNELL UNIVERSITY

SPECIAL ARTICLES

REFLECTION OF LIGHT FROM THE SURFACES OF LEAVES

THE classical studies of Brown and Escombe[1] on the interchange of energy between the leaf and its environment form our only important sources of information as to the quantitative income and outgo of energy during the processes of photosynthesis, transpiration and thermal emissivity. They measured the solar radiation with much care, determined the coefficient of absorption of energy by the leaf, measured the amount of energy expended in the various forms of internal work, and the gain and loss of energy during positive or negative thermal emissivity at the leaf surface. From these various determinations they attempted to construct a balance sheet of the energy income and outgo of the leaf.

Careful consideration of their work makes it obvious that their figures, which account for 100 per cent. of the energy inflow in terms of work and transmission, can not be as accurate as they appear to be at first glance. The most patent error is one to which they referred, but neglected because they thought it was a small error. This is the reflection of light from the leaf surface, which, they say, with perpendicular incidence "must be very small in amount." The reflected light was allowed to enter, as an error, into the calculation of the coefficient of absorption, which is therefore too large.

During the last two years many measurements of the reflection of light from leaf surfaces have been made by means of the Keuffel and Esser direct reading spectrophotometer. This instrument is designed to measure the percentage of reflection at an angle of 90° to the surface of the leaf when the incident light falls upon the leaf from almost every possible angle. By means of a wheel, carrying a wave-length

[1] Brown, Horace T., and Escombe, F. "Researches on some of the Physiological Processes of Green Leaves with Special Reference to the Interchange of Energy between the Leaf and its Surroundings." *Proc. Royal Soc.* London B. 76: 29–111. 1905.

TABLE I

PERCENTAGE OF 90° REFLECTION OF BRIGHT DIFFUSED LIGHT FROM THE SURFACES OF LEAVES

Species	Wave Lengths in mμ														
	430	440	460	480	500	520	540	560	580	600	620	640	660	680	700
Syringa vulgaris															
Upper surface	3.0	3.5	4.5	4.5	4.5	5.0	6.0	6.5	6.0	5.5	5.0	5.0	4.0	3.5	3.0
Lower surface	8.5	8.0	8.5	9.0	10.0	12.0	16.0	16.0	14.0	13.0	12.0	11.0	8.0	8.0	8.0
Morus rubra															
Upper surface	4.0	4.5	5.5	5.5	5.5	6.5	8.5	8.5	7.0	5.5	5.0	5.0	5.0	5.0	4.0
Lower surface	7.5	8.0	8.0	9.0	10.0	12.5	14.0	15.0	13.0	11.0	10.0	10.0	9.0	7.5	10.0
Populus alba															
Upper surface	6.5	7.5	9.0	10.0	12.0	14.0	19.0	20.0	16.5	13.0	12.0	12.0	10.5	10.0	8.5
Lower surface	50.0	50.0	50.0	50.0	50.0	51.0	50.0	52.0	53.0	51.0	52.0	51.0	50.0	51.0	50.0
Psedera quinquefolia, autumn crimson															
Upper surface	5.0	4.5	4.5	5.0	5.5	6.0	7.0	6.5	7.0	9.0	12.0	13.0	12.0	8.0	17.0
Lower surface	9.0	11.0	13.0	14.0	14.0	17.0	19.5	21.5	22.5	24.0	26.0	28.0	22.0	18.0	28.0
Betula alba, autumn yellow															
Upper surface	5.0	6.0	6.0	7.0	8.0	16.0	24.0	30.0	33.0	35.0	37.0	39.0	42.0	38.0	32.0
Lower surface	11.0	12.0	12.0	13.0	15.0	23.0	26.0	30.0	32.0	33.0	33.0	34.0	39.0	36.0	35.0

scale, the constant deviation prism of the spectrometer may be adjusted to throw light of any desired wavelength into the comparison telescope. It is possible, therefore, to measure the percentage of reflection in each portion of the spectrum from 430 mμ to 700 mμ. The measurements were made at about 20 mμ intervals across the spectrum, for many different kinds of leaves, chosen for variation in color, texture, and quality of surface. The accompanying Table I presents a few of the measurements.

From the measurements presented, it is seen that the greatest reflection in green leaves usually falls at about 540 to 560 mμ, and in the darkest green leaves like those of *Syringa vulgaris*, the reflection is a little over 6 per cent. in this region of the spectrum. In lighter green leaves, as in *Populus alba*, the reflection is much greater, 20 per cent. at 560 mμ. The under surface of the leaf of *P. alba* is very hairy and white. The reflection from this surface was about the same across the entire spectrum as would be expected in a gray color, and accounted for fully 50 per cent. of the incident light.

In autumn colored leaves, such as the crimson leaves of *Psedera quinquefolia* and the brilliant yellow leaves of the white birch, *Betula alba*, the greatest reflection naturally occurs in the brighter regions of the spectrum, at 640 and 660 mμ. The upper surface reflection of *Psedera* leaves is low in comparison with the reflection from *Betula* leaves. The latter in autumn brilliancy reflect over 40 per cent. of the incident light, the former about 13 per cent. Many other measurements have been made with similar results. These will be published in detail elsewhere.

The results indicate that we are not justified in omitting reflection as a factor when we attempt to develop a balance sheet for energy "revenue and expenditure" of leaves. If the correction of the coefficient of absorption of energy could be made in some simple manner for the reflection factor, the omission would not be so serious. But if we correct this item in the energy relations, the other figures have to be changed also, and no simple correction can be applied to these. They can only be remeasured, and the entire work done over, with reflection taken into account.

As Brown and Escombe did their work chiefly with the leaves of one species, *Catalpa bignonioides*, it is certain that many leaves differ from this species in mass per square centimeter of surface. This difference will also disturb the calculated balance of energy with special reference to thermal emissivity. The energy relations of leaves are therefore in need of reinvestigation, and the balance sheet of energy should be constructed on the basis of a more critical study of all the energy factors involved, and on the basis of a study of a number of leaf types.

CHARLES A. SHULL

UNIVERSITY OF CHICAGO

School of Medicine
Western Reserve University

Cleveland, Ohio

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SCIENCE NEWS

Science Service, Washington, D. C.

NATURAL, CULTURE AND ARTIFICIAL PEARLS

TRUE pearls derive their origin from the accidental introduction of an irritating foreign substance into certain cell tissues of the pearl oyster or other pearl-bearing mollusc. This foreign substance—parasitic worm, watermite, grain of sand—which finds its way by accident into the tissues of the oyster becomes the nucleus of a natural pearl, the most prized and most valuable of the three classes. The cells of the oyster proceed at once to imprison the foreign substance, surrounding it with layer upon layer of nacreous material, of the same iridescent character as the inside shell of the oyster.

Since the discovery of the origin and growth of natural pearls, man has been striving to produce these results by artificial means, that is, to grow culture pearls. Simple as the process may seem, it was not until 1894 that Kokichi Mikimoto in Japan, developed a satisfactory method for inducing the development of culture pearls. The success of this venture is attested to by the fact that he was able to produce an annual output valued at $600,000 in 1921.

Imitation pearls are a synthetic product manufactured in large quantities from pearl essence—a product derived from fish scales. Formerly the source of supply was a small Europeon minnow, the iridescent effect being discovered by accident by Jaquin, a French rosary maker, about 1656. Jaquin noted that the water in which the fish had been washed contained a highly lustrous substance which, when concentrated and applied to small globes of alabaster, produced remarkably good imitations of pearls. During the War, the European source of supply of fish scale essence or pearl essence was cut off. Experiments with the scales of native American fishes resulted in the development of an entirely new industry in this country. Some two million pounds of the scales of such fishes as our north Atlantic sea herring and river herring are used annually, the uses for fish scale essence are steadily increasing and the cost of producing excellent imitation pearls is decreasing. Large sheets of celluloid are also given a coating of imitation mother-of-pearl and used as backs for brushes and many other toilet articles.

But to return to the question of the means for distinguishing between the three classes of pearls under discussion, as pearl essence is usually applied as a thin coating, little difficulty will be experienced in ascertaining whether your possession is an imitation pearl. The celluloid coating can be cut or peeled off or dissolved off with amyl acetate or acetone.

As between culture pearls and natural pearls the problem of differentiation is a most difficult one. Yet, because of the difference in sales value, one buying a natural pearl wishes to assure himself that he is getting what he is paying for. In perfection of form and lustrous beauty there are no distinguishable differences. There is no chemical difference, the same cells of the oyster function after the same manner in producing a pearl. When the culture pearls began appearing there was considerable litigation in France and the courts concluded that culture pearls possessed all the specific characteristics of real pearls and their quality could not be questioned.

Since 1923, a small group of Japanese investigators acting on the suggestion of Professor Nakamura have been studying the problem, and have recently published the results of these investigations in the Proceedings of the Imperial Academy of Tokyo, Japan.

By the use of the X-rays they were able to distinguish between culture pearls and natural pearls. In the former, a perfectly spherical nucleus of shell is introduced into the oyster and around this the oyster builds the pearl. An examination of natural pearls, of culture pearls, and of the nuclei used in culture pearls by the expert in X-ray analysis and a comparison of the patterns produced for different orientations of the primary X-rays revealed valid differences between the two classes of pearls. It will undoubtedly be comforting to many to know that a method of differentiation has been evolved.—*Louis Radcliffe.*

THE DESIGN OF AIRPLANES

THERE is no "best" type of airplane, it all depends on what it is expected to do; and the plane should be as simple as possible, for then there are less chances for things to go wrong. This is the belief of the Honorable Edward P. Warner, assistant secretary of the Navy for aeronautics, and former professor of aeronautics at the Massachusetts Institute of Technology, expressed in an address in Philadelphia before the Franklin Institute.

"The quest for a universally applicable formula, for a hard and concrete statement of what is 'best' in design, has been persistent and unavailing. One of the many committees which has investigated the aeronautical activities of the government of the United States made a special effort to secure some sort of a 'yardstick' whereby statesmen comparatively uninstructed in the purely technical aspects of aviation could rate the merits of aircraft, but the effort was, and would be likely always to be, in vain.

"What is 'best' depends upon the end to be accomplished. Neither monoplane nor biplane has proved itself definitely and generally superior to the other. Machines with external bracing have neither driven from the field nor been overcome by those with the structure contained within the wings. Airplanes with one engine and those with two engines and those with more exist side by side."

In Mr. Warner's opinion, the design of airplanes is pretty well stabilized, and will probably not suffer any fundamental change for many years to come.

"It would not do to ignore or deny the possibility of invention producing a fundamental modification in the whole mode of operation of heavier-than-air craft," he

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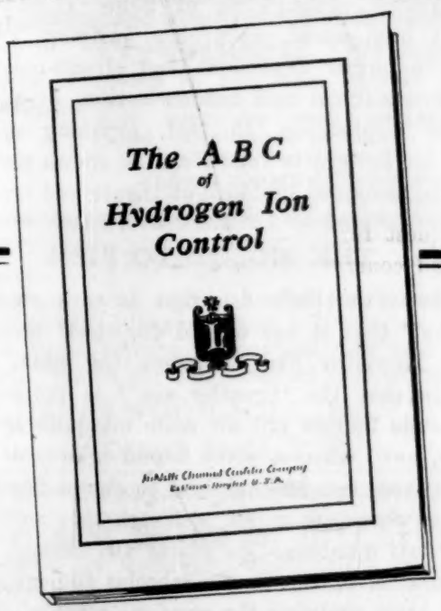

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said, "but whatever happens the laws of aerodynamics will remain unchanged and will continue to govern the behavior of every machine that flies, however the details of its means of propulsion and of support might be changed.

"Anything may happen, but for myself I am not among those sanguine spirits who expect to see the airplane as we now know it displaced by some radically different machine capable of vertical ascent or descent, or other valuable novelties of performance. Such devices deserve the most serious consideration and examination and they may well prove of great usefulness in certain employments, but they are subject to fundamental difficulty in that they all involve some continuously moving parts within the structure. A rigid structure can be designed so that its chance of collapse is infinitesimal, but as soon as bearings and moving parts are introduced, even with the most careful design and the most watchful maintenance, there exists the chance for something to go wrong.

"If the upkeep is as slack as it is likely to become in the hands of the average private owner the chance is multiplied.

"To complicate the structure is to make the minimum conditions of safety less simple and sure, and it is because most of the proposals for radical modification in the fundamental method of operation of heavier-than-air craft are suggestions for increasing complication and for introducing new working parts that I view them as a whole with a considerable skepticism."

THE CHRONOTEINE CAMERA

FEEDING movie film through a camera at the rate of three miles a minute to slow down rapidly moving machinery to about one two-hundredth of its normal speed is the feat accomplished by C. Francis Jenkins, of Washington. At the meeting of the Society of Automotive Engineers in Detroit Mr. Jenkins told of the "chronoteine camera," one of his latest inventions, and how it may be applied to the study of automobile engines.

Instead of the sixteen pictures a second, taken by the ordinary movie camera, or the 128 taken by the "ultra-rapid" camera now frequently used in filming athletic events, the chronoteine takes 3,200 pictures a second at its normal rate. If desired, it can be speeded up even further, and take as many as 10,000 a second. When these are projected in the ordinary machine at the speed of 16 a second, the apparent speed of the motion is correspondingly reduced. When taken at 3,200 per second, the reduction of speed is 200 times, and at the higher speeds it is of course greater.

In the usual type of motion picture camera, the film is stopped for each exposure, so that it stops and starts sixteen times a second. At such high speeds as those employed in the chronoteine camera this is impossible, for the film would be torn to pieces. Therefore it is moved through in a steady stream.

A further difficulty is introduced, because with a single lens extremely short exposures would have to be made. Otherwise the picture would be blurred, just as if the object itself were close to the camera and moving at such a high speed. Mr. Jenkins has avoided this difficulty by providing 48 lenses, set in the periphery of a 13-inch disc, which turns at a speed of 4,000 revolutions per minute. The film moves back of one side of this disc, so that the images formed by the lenses move right along with the film. In fact, the exposures overlap, as the exposure is begun through one lens before that through the preceding lens is completed. At 3,200 exposures a second, each one is about one twenty-five-hundredth of a second in length. With the rapid lenses used, and sensitive film, this is easily sufficient for a fully timed negative in bright sunlight. In the ordinary movie camera, at 16 a second, each exposure is about one thirty-second of a second in duration.

Mr. Jenkins calls attention to the good photographic quality in the pictures, which is unusual in such high-speed studies. "The pictures are true photographic pictures having half-tone values like other motion pictures, not mere shadowy outlines of grayish silhouettes," he says. "They are made out of doors as well as in the laboratory, of large subjects or small subjects, and from a moving vehicle as readily as from a fixed platform.

"The chronoteine camera is an instrument for the study of many problems in science and engineering, some of which are not possible of accurate determination in any other way. Some additional applications of this instrument which immediately suggest themselves are a study of gun recoil, shell trajectories and plate impacts, airplane propellers and landing-gear action, bursting of balloons and air hose, tire action over obstructions, water streams, propagation of flame, engine-valve rebound at high speed, cam-roller jumping, crank-shaft whip; transformer explosions and circuit-breaker arcs; shuttle thread-knots and bobbin action, brake-shoe and draft-gear application, in fact, anything that moves too fast for the eye to follow can be shown slowed down and can be examined in detail at leisure and repeatedly."

THE MOSQUITO FISH

GAMBUSIA, the little fish that is such an enemy of "wigglers" that it has earned for itself the honorable title of Mosquito Fish, reverses the usual order of nature, in that the "gentler sex" is the male. The world's rude buffets kill off male mosquito fish as they grow up, until when a given brood arrives at maturity there are from two and one-half to eleven times as many females as there are males, although they started out in life in equal numbers. So states Dr. Samuel F. Hildebrand, director of the U. S. Fisheries Biological Station, who has been studying the survival rates of these little but economically and hygienically important fish. The sex ratios vary according to the season, being about 2.5 females to 1 male in June, and 11.3 females to 1 male in August.

The reasons for the higher death-rate among the young males have not been fully worked out, but it is suggested that inasmuch as they are considerably smaller than the females they fall easier prey to carnivorous fish. Moreover, the females themselves frequently attack and

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kill the males, which seem to be too chivalrous or else too timid to bite back. Finally, experiments indicate that unfavorable environmental factors, such as lack of oxygen in the water, affect the males more severely than the females.

In spite of the predominance of females it is not believed that the breeding rate is held in check, for the fish are highly polygamous.

MUMMIES IN NEW MEXICO

THE discovery of some interesting mummies has been announced by Frank Pinkley, superintendent of southwestern monuments for the National Park Service. At the Aztec Ruin, in New Mexico, excavation work has been in progress for the purpose of getting daylight down into a row of prehistoric rooms being used for museum purposes. In the course of this work two child burials were taken from the floor, one with a very interesting black obsidian pendant, two decorated dippers, a mug and two dishes containing food. This mummy was first wrapped in feather cloth and then in matting, and in addition had beneath it a large reed screen and over it a large mat.

The body itself was wrapped as a large package and tied with yucca cord. The pendant had slipped from the package, and it is believed by George L. Boundey, custodian of the monument, who made the excavation, that there are other ornaments within the wrappings. He did not open them, however, as the whole is in such a good state of preservation and is an excellent museum exhibit.

The other child burial found at Aztec had with it an ax, a basket, a flat board, and about a pint of corn ears. One ear, of red corn and just as fresh looking as though from last year's crop, has about half the kernels still in place. Mr. Boundey states this is unlike any corn he ever saw before. In the hard dirt floor of the lower story of rooms in the ruin five soft breaks were noticed. One of these was partially dug out and disclosed some peculiarly carved sticks and three pots.

Montezuma Castle National Monument, in Arizona, also yielded a prehistoric infant burial, which has been added to the museum at that place. The child had been buried with eleven shell bracelets over one arm and a string of shell beads around the neck. This mummy was discovered by Mrs. Martin L. Jackson, wife of the custodian of Montezuma Castle. She also unearthed two fine fragments of lace or embroidered cloth.

ITEMS

THE general death rate of the industrial population of the United States and Canada for 1927 will probably be the lowest ever reported, according to figures already available from the records of the Metropolitan Life Insurance Company. The chief factor in bringing about this decrease is the drop in the influenza death rate to about half that of 1926, with an accompanying decline in pneumonia mortality. Deaths from tuberculosis probably will reach a new low level in 1927, it is stated, attaining a point that would have been regarded as nothing less than visionary as short a time as ten years ago. Whereas the rate was 224.6 deaths for every 100,000 of the company's policyholders in 1911, the indications are that for 1927 it will not exceed 90 per 100,000. The year just past, however, will show no decrease in the number of accidental deaths over the last three or four years. The rising toll of the automobile, the statisticians report, along with considerably more suicides and a small increase in homicides all combine to make the 1927 record of violent deaths decidedly depressing.

THE ability of a living diphtheria bacterium to pour poisons into the blood stream of humans bears a relation to the size of the charge of electricity which each bacterial cell carries, according to Drs. I. S. Falk, L. B. Jensen and J. H. Mills, of the University of Chicago. Their electrical measurements can be made in a few minutes and with simple apparatus on cultures thought to be capable of producing toxin. The results are obtained much more rapidly than by time-consuming methods of animal experimentation. The electrical method is based on the fact that the power of the bacterium to excrete poisons depends on the porosity of its outer wall. This, in turn, affects the electrical charge on the cell as a whole. The observation is made by placing the suspected organisms in a small chamber between metallic plates charged to a definite electrical potential. The rate at which the bacteria cross the electrical field is then watched through a microscope. The virulence of the germs can be calculated by reference to the rate of "migration" of a stream of diphtheria of known toxin-producing power. This new method is expected to speed up detection of cases of diphtheria, and to facilitate release from quarantine.

NEW light has been shed on the problem of getting the marten, an animal of the mink family whose skin is highly prized for fur, to produce offspring during captivity. Research conducted by Frank G. Ashbrook and Karl B. Hanson, of the U. S. Biological Survey, at a federal fur farm in the foothills of the Adirondacks indicates that contrary to general belief martens of opposite sex will live together in peace and harmony during most months of the year. The males, however, fight ferociously whenever they come in contact. The normal breeding season, Mr. Ashbrook declares in a report in a forthcoming issue of the *Journal of Heredity*, is late summer rather than during the winter as was previously supposed. The normal gestation period, moreover, may require as long as eight months instead of the two or three that naturalists have assumed in the past.

THE puncture vine, whose sharp-pointed burrs cause endless trouble to motorists in California, has made its appearance in Australia, it has just been learned. The Australian authorities are endeavoring to stamp it out by piling refuse on it and burning both vine and seeds. Botanists have given the vine the appropriate name *Tribulus terrestris*, which means "trouble of the earth." It is stated that its original home was in the Mediterranean region, but like many ill weeds it has become a great traveler.